

**UNDERSTANDING PRESCRIBING
BEHAVIOUR OF TUBERCULOSIS DOCTORS
IN THE CONTEXT OF INTEGRATED
SERVICE DELIVERY: A CASE STUDY OF
TWO DESIGNATED HOSPITALS OF
ZHEJIANG PROVINCE, CHINA**

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requirements for the degree of Doctor of Philosophy

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Abstract

There is on-going debate regarding if and how integrated service delivery might affect quality of care for infectious diseases traditionally delivered through vertical programmes. In China, tuberculosis (TB) care has recently been integrated into ‘designated’ public hospitals at the county level. However, the integration initiative has caused concerns among hospital providers about cost recovery for poorly funded public hospitals. These concerns are partially reflected in the prescription of non-standardized, non-free auxiliary treatment for TB patients, which increases patients’ financial burden and compromises quality of care. This study applies Complex Adaptive Systems (CAS) thinking to understand providers’ prescribing behaviour in the context of integrated service delivery in TB designated hospitals in Zhejiang province, China.

A case study approach was applied to research conducted in two designated hospitals, where the TB clinic was subsidized through local government or the hospital respectively. This study started with a retrospective review of 340 medical charts of uncomplicated TB patients. Informed by the results of this review, 47 semi-structured interviews were conducted with health officials, public health officers, and hospital staff members such as managers and TB clinicians, radiologists, laboratory staff and nurses. The working environment of the TB health workers was also observed. A thematic approach was used to formulate the initial coding frame, as guided by the conceptual framework.

Hospital-based integrated TB care is highly medicalised due to strong medical culture and values associated with the integrated care. In both hospitals, non-standardised, non-free prescription of drugs and interventions for uncomplicated TB is common, with no consistent patterns for the two hospitals. This can also be attributed to lack of clear guidelines, weak doctor-patient relationship and hidden financial incentives of TB doctors. Staff motivation is low due to the perceived poor opportunities for professional development in TB work, the perceived gap in salaries as compared to other clinical staff, and the limited provision of risk protection measures for TB health workers. Welfare of TB health workers, who generate limited income for hospitals, is accorded low priority. Professional differences and tension between public health and medical professionals remain the biggest barrier to ensuring clinical governance for TB control in the hospitals.

This study suggests that non-standardised prescribing behaviour is a dynamic response to the systemic conditions generated by the current model of integrated service delivery in the designated hospitals in China. Delivering free and standardised integrated TB care in the designated hospitals is challenging in the context of highly fragmented disease control and clinical structures and market-orientated health services.

Using CAS thinking has helped to shift attention from a functional analysis of the health systems ‘building blocks’ and their mechanical interactions towards a more dynamic way of examining emergence, feedback loops, adaptation and relationship management in the study of integrating a public health function (TB care) within a hospital setting. The study will inform the on-going discussion of strengthening the quality of integrated service delivery model in China and public-private mix for TB control in other similar contexts.

Key words: Complex adaptive system, TB, integrated service delivery, hospital, China

Declaration

I hereby declare that this submission is my own work and that, to the best of my knowledge, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any degree of the university or other institute of higher learning, except where due acknowledgement has been made in the text.

Acknowledgements

I would like to conclude this thesis with a famous Chinese poem: ‘Sharp edge of a sword comes out from grinding, and plum blossom's fragrance comes from the bitter cold.’ What helped me to come to this moment is the perseverance, dedication and an open-mind.

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Abbreviations

DOTS	Directly Observed Therapy, Short-Course
NHFPC	China National Health Family Planning Commission
CHE	catastrophic health expenditure
FDC	Fix-dose-combination
GDP	Gross domestic product
GFATM	Global Fund to Fight Against AIDS, TB and Malaria
GHI	Global Health Initiatives
LMICs	Low-to-middle income countries
LoS	Length of Stay
NCMS	New cooperative medical scheme
OOPP	Out-of-pocket-payment
PPM	Public-Private/Public Mix
PHC	Primary health care
PP	Private practitioner
SDG	Sustainable Development Goals
SARS	Severe Acute Respiratory Syndrome
TB	tuberculosis
NTP	National Tuberculosis Control program
RNCTP	Revised National Tuberculosis Control program(in India)
WHO	World Health Organisation

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Chapter 1 Introduction

1.1 Rationale and motivation for the study

There is on-going debate regarding whether and how integrated service delivery might affect quality of care for infectious diseases traditionally delivered through vertical programmes. China has the third largest tuberculosis (TB) burden in the world. TB care, which used to be provided by the TB programme located at the Centre for Disease Control (CDC), has recently been integrated within ‘designated’ public hospitals at the county level. This initiative is built on the assumption that hospitals have stronger technical capacity, and can provide better quality of care. TB patients diagnosed in the designated hospitals enjoy the government’s free treatment policy, which covers the outpatient-based diagnostic services and TB drugs recommended by the national guidelines. However, integration of public health functions, including TB care, within the general hospital has caused growing concern about cost recovery. Public hospitals in China have long suffered from poor government funding since financial decentralization in the 1980s. The public hospital reform launched in 2009 does not necessarily change the legacy of China’s market experiment and profit-driven hospital services (Blumenthal and Hsiao 2015). After TB services are integrated into the designated hospitals, little government funding is given to the designated hospitals to support the newly integrated services, apart from the routine TB drugs and medical tests covered by the free treatment policy. These concerns are partially reflected in the prescription of non-standardized, non-free, auxiliary treatment for TB patients. This increases patients’ financial burden and compromises quality of care as TB patients have to pay for extra examinations and drugs prescribed by doctors. Very few, if any, health insurance schemes cover TB service on an outpatient basis, with limited reimbursement for patients (Wei et al. 2014; Xiang et al. 2016).

At the time of study, an important debate for TB control policy in China was whether the government should fund the newly integrated TB clinics. In most of the counties, the hospitals are responsible for covering the costs of human resources and other operational costs of the TB clinics (hereinafter called ‘hospital-subsidised TB clinic’). In a few counties, TB clinics received additional funding from the local government, which was

meant to subsidise their routine costs, such as human resource and other operational costs (hereinafter called ‘government-subsidised TB clinic’). Improving government input to the newly established TB clinics is assumed to help to reduce the perverse incentives of TB health providers in the designated hospitals. In earlier work, I suggested that the designated hospital with the government-subsidised TB clinic in better-off counties appeared to have better perceived processes of service management, as compared to the designated hospital with the self-subsidised TB clinic in poorer cities. For instance, the former appeared to have a better resource allocation system and patient-centered care than the latter (Zou et al. 2012). This study triggered my interest to further explore whether the different types of funding models of TB clinics in the designated hospitals would influence the prescribing behaviour of TB doctors under the new public hospital reform launched in 2009.

To pursue this interest, I purposefully chose two designated hospitals- one with a ‘government-subsidised’ TB clinic, and the other without any government subsidy on the TB clinic in Zhejiang province, one of the pioneering provinces in China in implementing the integrated model of TB service delivery. However, after I went into the field and started to talk to people in the designated hospital with a ‘government-subsidised TB clinic’, I found that TB funding was earmarked, but not necessarily allocated, for TB activities in practice. Given this situation, I felt that it would be challenging to understand the influence of the funding model of the TB clinic on the prescribing behaviour of the TB doctors. Therefore, I abandoned my original hypothesis and broadened the scope of the study to situate the understanding of the observed prescribing behaviour within the context of integrated service delivery and public hospital reform.

This PhD study was initiated during my research employment (2008-16), with the China programme, Communicable Disease Research/Health Service Delivery Programme (COMDIS/-HSD)¹, hosted by University of Leeds, UK. As a key researcher, I was involved with a number of research projects, including evaluation of different models of TB service delivery in China. While these studies were mainly operational research by

¹ Funded by UKAID/DFID.

nature, I was very keen to use health systems thinking to provide rich, in-depth, and systematic explanation of the problems, such as over treatment of TB, associated with the integrated service delivery. This study coincides with the development of systems thinking in health systems studies, which recognise health systems as a complex adaptive system (CAS). In addition, TB control related health system studies in China were largely dominated by positivist-based quantitative research. I felt it was necessary to contribute to the qualitative and mixed-method research approach to provide rich and in-depth understanding of TB control.

Thanks to the research employment, I had the privilege of visiting many designated hospitals in different counties, talking to different health providers, patients and policy makers, and working with senior researchers in both the UK and China. This further stimulated my enthusiasm to conduct research on an integrated model of care delivery- the ongoing reform of TB service delivery in China (Administrative Office of State Council, the Government of China 2017). The study turns out to be rewarding experience. Not only have I improved my understanding of the topic under study, but also the capacity of conducting health systems research with solid training in social science research methodology and up-to-date health system theories. For instance, one of the important benefits is the mastery of the CAS theory, considering both the hardware and software components of the health systems in the study of the integrated TB service delivery.

1.2. Background

1.2.1 Global TB control, public-private/public Mix (PPM)- DOTS (Directly Observed Therapy, Short-course) for TB service delivery

Global TB control achieved the target of Millennium Development Goals (MDGs) set in 2000 to halt and reverse the TB incidence by 2015, in each of the six World Health Organisation (WHO) regions and in 16 of the 22 high-burden countries(WHO 2015). Globally, TB incidence has reduced by 18% as compared to 2000. TB mortality has decreased by 47% since 1990, while nearly all of that improvement was achieved after 2000. The target of halving the TB mortality rate by 2015 compared with 1990 was met

in four WHO regions² and in 11 high-burden countries³. TB prevalence has decreased by 42% since 1990; and the target of halving the prevalence compared with 1990 was met in three WHO regions⁴ and in nine high-burden countries⁵. All three of the 2015 targets, i.e. incidence, prevalence and mortality, were achieved in nine high-burden countries⁶ (WHO 2015).

Despite these gains, TB remains a major global health problem. With 1.5 million TB deaths, including 0.4 million TB deaths from people living with HIV, TB ranked above HIV/AIDS as the leading cause of death in 2014 (WHO 2015). In 2014, there were an estimated 9.6 million new TB cases, and 480,000 new Multidrug-resistant TB (MDR-TB) cases. India, Indonesia and China had the highest burden of TB in the world, accounting for 23%, 10% and 10% of the global total, respectively (WHO 2015). As part of the targets to achieve the Sustainable Development Goals (SDGs) for 2030, the WHO's End TB Strategy calls for a 90% reduction in TB deaths and an 80% reduction in the TB incidence rate by 2030 and no catastrophic expenditure among TB affected families, compared with 2015. The WHO End TB Strategy is supported by four principles and three pillars (Box 1.1) (Uplekar et al. 2015).

² the Region of the Americas, the Eastern Mediterranean Region, the South-East Asia Region and the Western Pacific Region

³ Brazil, Cambodia, China, Ethiopia, India, Myanmar, Pakistan, the Philippines, Uganda, Viet Nam and Zimbabwe

⁴ the Region of the Americas, the South-East Asia Region and the Western Pacific Region

⁵ Brazil, Cambodia, China, Ethiopia, India, Myanmar, the Philippines, Uganda and Viet Nam

⁶ Brazil, Cambodia, China, Ethiopia, India, Myanmar, the Philippines, Uganda and Viet Nam

Box 1.1 The WHO End TB Strategy

Four principles

- government stewardship and accountability, with monitoring and evaluation;
- a strong coalition with civil society organisations and communities;
- protection and promotion of human rights, ethics and equity; and
- adaptation of the strategy and targets at country level, with global collaboration.

Three pillars

- integrated, patient-centred TB care and prevention;
- bold policies and supportive systems; and
- intensified research and innovation.

Global TB control adopts a systematic public health approach called DOTS (Directly Observed Therapy, Short-course) (Box 1.2) recommended by WHO since the 1990s. DOTS is largely implemented by public sector services under national TB programmes (NTPs). However, many patients seek care from a variety of health services especially the private providers. Usually these providers were not formally included within the DOTS framework, and have been reported to engage in inadequate TB management practices without reporting TB cases and treatment to the National TB Programme (NTP) (WHO 2006). In the early 2000s, a public-private/public Mix (PPM-DOTS) approach to service delivery was proposed by WHO as one of the essential components for the Stop TB Strategy. PPM-DOTS aims to extend effective DOTS services from the NTP to all public, voluntary, corporate and private providers (WHO 2006). In general, PPM-DOTS was effective in improving case detection and treatment outcomes, patient accessibility and quality of TB care, although its cost-effectiveness and equity in access to care was inconclusive (Malmberg et al. 2011). As one of the key components for its second pillar (to establish ‘bold policies and supportive systems’), the WHO End TB Strategy again emphasises the need to engage the communities, civil society organisations, and all public and private care in effective TB control (Uplekar et al. 2015).

Box 1.2 DOTS components

- Political commitment with increased and sustained financing;
- Case detection through quality-assured bacteriology;
- Standardised (and free anti-TB drug) treatment, with supervision and patient support;
- An effective drug supply and management systems; and
- Monitoring and evaluation system, and impact measurement.

Most published studies on PPM-DOTS have focused on involving private or community based providers. There are far fewer studies on integration of TB care within public and private hospitals. In many high-burden countries, especially in Asia, there is a large public and private hospital sector, where a high proportion of estimated cases are diagnosed and treated. Generally, these countries faced similar challenges that many TB patients treated in the hospital sector are neither reported, nor managed, according to national guidelines (Chiang et al. 2007). In these countries hospitals were not included in initial plans for rapid DOTS expansion. However, integration of DOTS programme with public and private hospitals has been common in African countries. Hospitals were either included into the initial plan of DOTS expansion, or DOTS implementation before being decentralized to the community health services later (Ohkado et al. 2009).

Indonesia is one example of an Asian country where DOTS is increasingly included within larger hospitals (Irawati et al. 2007, Probandari et al. 2008; Probandari et al. 2010; Probandari et al. 2011). Studies have reported the processes of integration, with mixed results observed for the process and outcome of TB care. This study focuses on the prescribing behavior of TB clinicians based in designated hospitals in the context of integrated service delivery in China.

1.2.2 TB control in the context of health systems development in China

With nearly one million new TB cases, China has the third largest TB burden in the world, following Indonesia and India in 2015. TB control in China is further challenged by the

management of MDR TB, TB/HIV co-infection and population migration as well as the high out-of-pocket payment that affects adherence to treatment (Guo and Huang 2016; Keller 2018).

Before early 2000, TB control was extremely poor in China, with detection of estimated smear-positive TB patients at around 30% (Wang et al. 2014). The DOTS strategy which was implemented since the 1990s only covered half of the population in the country, and free TB treatment policy only covered smear positive TB patients before 2000 (Wang et al. 2014). In the transition to a market economy and financial decentralisation in the mid-1980s, the hospital sector (largely public) had to boost their income through charging from patients by providing additional services and selling drugs. Many TB patients treated in hospitals discontinued the treatment due to the heavy financial burden. The nationwide survey in 2000 showed that 80% of TB patients treated in the general health care sector did not use medications regularly (Wang et al. 2007). During that period, financial decentralization has also negatively affected the TB control especially in the poorer areas, with poorer direct government support to TB control and poorer performance of DOTS programmes (Meng et al. 2004). The county CDC also had little incentive to conduct TB control activities, since TB control was labour intensive and generated little income. Even in the CDCs, where free diagnosis and treatment were provided, ancillary tests and drugs with uncertain clinical benefits were prescribed. The performance of the TB programme during this period was not only poor, but also may have encouraged the spread of MDR TB in China (Wang et al. 2007).

The performance of the TB control programme was marked by significant improvement between 2000-2010. In 2010, China halved its TB prevalence, and achieved significantly better TB treatment outcomes as compared to 1990 (Wang et al. 2014). The recent achievements of TB control in China are mainly attributed to the successful scale up of the DOTS strategy, through the local CDC networks and free treatment policy to all the TB patients in the country after 2000 (Wang et al. 2014). TB control also largely benefited from the strengthening of the public health system following the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003. Since then, the Chinese government has increased

its political commitment and funding for public health, established the world's largest national internet-based communicable disease reporting system, revised law on the control of infectious diseases, and rebuilt the local public health facilities (Wang et al. 2007).

China's TB control programme relies on a semi-vertical structure, operated at four levels: national, provincial, prefecture and county levels. The TB control programme is led by the Health Bureau and coordinated by the county TB dispensary, which was restructured into the CDC in the early 2000s. The county CDC is the basic management unit for TB within its county boundaries. In most counties of China, the county CDC provides both clinical and public health functions for TB cases. In each county, general health services, including hospitals, are required to refer suspected TB cases with a cough of two weeks or haemoptysis to the CDC. TB patients registered and treated in the CDC are entitled to free diagnosis and treatment under the DOTS strategy. Complicated and severe TB cases are referred to the general hospitals. The CDC traces all referred cases not visiting the CDC within three days. This model of TB service delivery is known as the 'dispensary or CDC model' (Figure 1.1). As mentioned earlier, while most TB patients sought care from general hospitals, they were not often reported, or referred to the CDC. TB patients treated in the general hospitals often missed the opportunity for standardised diagnosis and treatment under the DOTS framework in the CDC (Wang et al. 2007; Yan et al. 2007; Wang et al. 2010). In the backdrop of global PPM-DOTS movement for TB control, to address the challenges of the poor reporting and referral from the general health care sector to the CDC, the Ministry of Health of China issued a number of guidelines to further clarify the standard of TB reporting, referring, and notification from general hospitals to the CDCs. Examples of the two important policy documents included: 'Notice about Further Strengthening of TB Report and Patient Management' and 'Operational Methods to Refer and Trace TB Cases' in 2004 and 2005 respectively. These PPM-DOTS activities in China coincided with the priority of public health strengthening after SARS and received support from international agencies such as the Global Fund to Fight against AIDS, TB and Malaria (GFATM).

A number of studies have reported the improved referral and reporting from general health facilities to the TB dispensary in the wake of the SARS epidemic and scale up of the PPM-

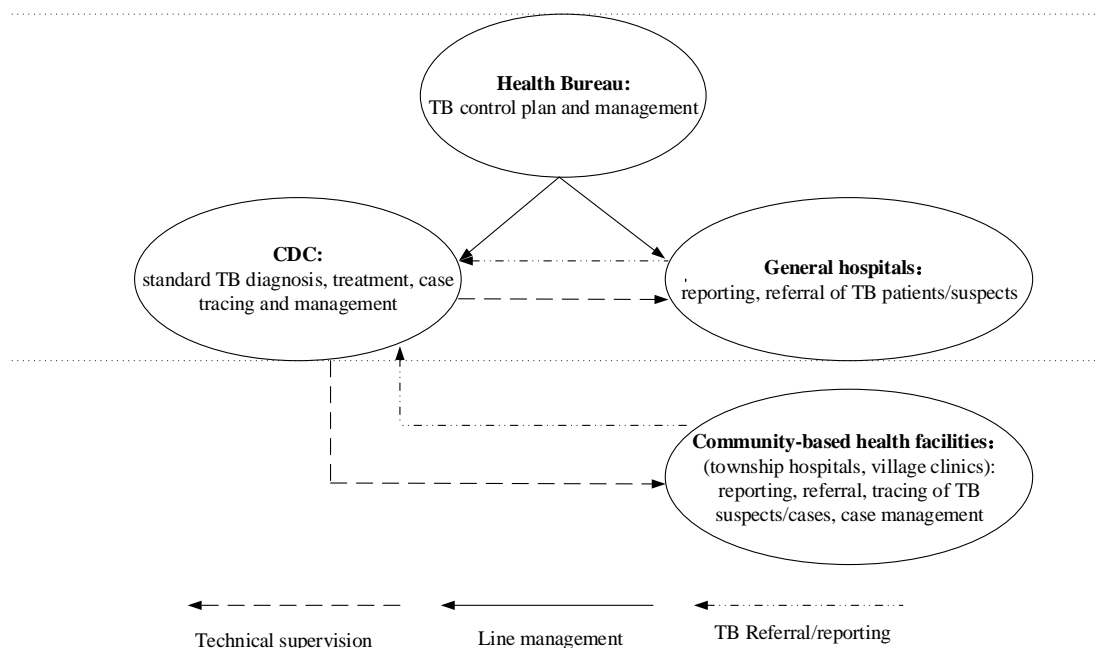
DOTS in China(Bai et al. 2008; Wang et al. 2009; Wang et al. 2010). These studies highlighted the factors related to the improved reporting and referral in the TB dispensary model (Box 1.3). However, despite the positive achievements, poor reporting and referral associated with non-standardised prescriptions and hospitalisation by the general hospitals remained as the most important problems for the TB dispensary model (Zou et al. 2015). Zou et al. (2015) pointed out that these problems could be due to the perverse incentives of the general hospitals, poor supervision and technical support from the TB programme to general hospitals, which were shaped by deeper health systems issues such as the persistent lack of funding for the general hospitals.

Box 1.3 Factors related to the improved reporting and referral in the TB dispensary model

- Improved government commitment, investment and regulatory environment in the wake of the SARS epidemic.
- Revisions of the Infectious Disease Control Law in 2004 to motivate hospitals to report 37 infectious diseases (including TB) within specific timeframes, essentially making under-reporting of TB a crime.
- Implementation of the world's largest internet-based disease reporting system, which largely improved the ability of the CDCs to obtain real-time information about TB suspects and cases seen in the hospital system, allowing timely monitoring of the process and the outcome of the hospital-dispensary collaboration.
- Establishment of a steering mechanism in the form of a local coordinating group under the health bureau.
- Improved funding including financial incentives, such as incentives for referral by the hospital staff and tracing by the field staff.
- Systematic training of hospital and dispensary staff.

(Source: Bai et al. 2008; Wang et al. 2009; Wang et al. 2010)

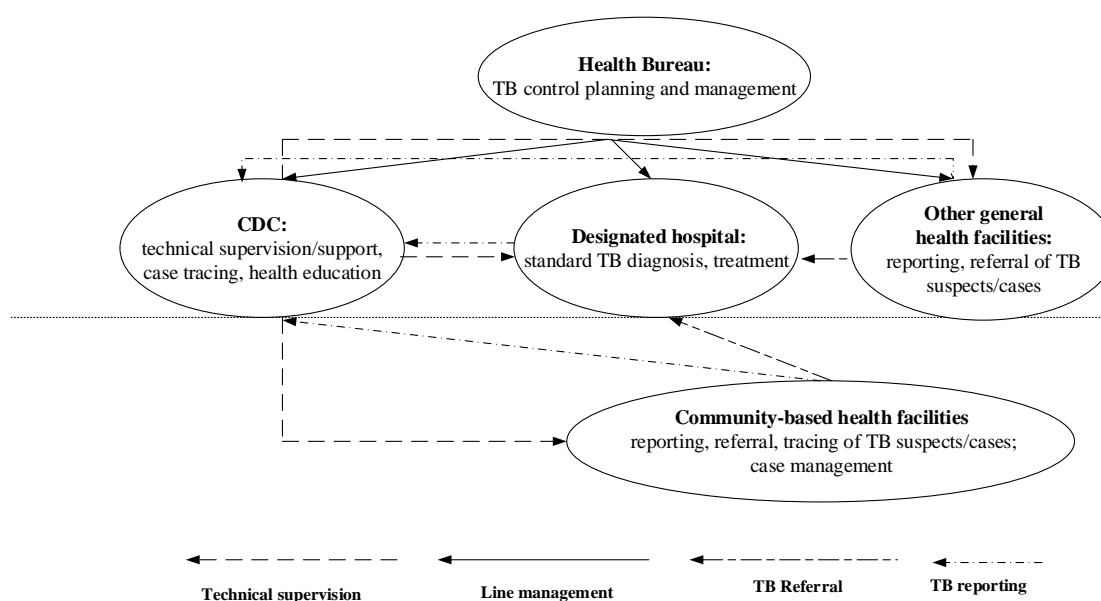
Figure 1.1 Organization of the CDC/TB dispensary model for TB service delivery in China



Since the 2000s, a new model of PPM-DOTS TB service delivery known as ‘integrated model’ initially emerged in some coastal provinces such as Shanghai, Zhejiang, and Jiangsu, but also in some of the western provinces supported by the GFATM. This model has been rapidly scaled up in recent years, with nearly 70% of the counties having implemented this model by 2017(Zhang X, personal communication, 1 May 2018), a jump from 30% in 2012(Jiang et al. 2013). As elsewhere in the world, integration of TB DOTS in the hospitals is based on the assumption that many of the TB patients are actually seen in the general health care sector, but improperly managed there. In addition, this initiative is also meant to make good use of the stronger resources in the general hospitals and address the inadequate human resources of TB control in the CDC. For instance, the national survey in 2007 found that 34% of the counties had less than five TB control staff, indicating a staffing gap to meet the needs of local TB control (NCTP, 2009). In this model, the clinical TB service is integrated in a general hospital, which is designated to undertake diagnosis, prescription and follow-up management of TB cases in the county catchment area. A TB clinic is established within the hospital, equipped with one or two TB doctors and a number of supportive staff such as nurses, pharmacists and laboratory staff. Other

clinical departments refer suspected TB cases to the TB clinic, while the public health department in the designated hospital is responsible for the internal management of reporting and referrals and the daily management of the TB clinic. Other hospitals and health facilities refer suspected TB cases to the TB clinic of the designated hospital. The CDC no longer provides a clinical TB service, but continues to fulfil their public health functions, such as referral management, reporting, staff training and case tracing and public health education (Figure 1.2).

Figure 1.2 Organisation of integrated model for TB service delivery in China



It is noteworthy that PPM-DOTS in China differs from most of the PPM-DOTS initiatives in other LMICs. In China, PPM-DOTS focuses on the collaboration between the public TB programme and general hospitals and township hospitals (mostly public), and village clinics (mostly private). For the PPM-DOTS in many other LMICs such as India, the public TB programmes largely collaborates with the private and voluntary sector.

The integrated model is believed to represent the orientation of TB service delivery reform (Wei et al. 2014). However, it cannot escape the challenges associated with the decentralized and market-orientated health systems. In China, financial sources for public

hospitals include government fiscal budgets, medical service charges to patients, and revenues from drug sales (World Bank. 2010). Fiscal budgets include recurring line items for personnel and investment or capital budget allocations for purchasing large-scale equipment, infrastructure construction and so on. Following financial decentralization in the mid-1980s, the government has greatly reduced funding to general hospitals. General hospitals were encouraged to raise funds by charging patients and were allowed to charge the patients an additional 15% of the wholesale cost of the medicines (Song et al. 2014). By the end of the 2000s, the government fiscal budgets only accounted for about 10% of the average revenues of the public hospitals; by 2008, drug sales were more than 40 percent of hospital revenues. The nearly 'self-financing' status of the public hospitals has pushed them to increase their revenue by offering more-expensive and more profitable services. There has been chaotic expansion of hospital infrastructure and high-technology equipment. Especially in rural areas, county-level hospitals dominate most of the health services, in sacrifice of primary care and outpatient facilities. Irrational over-provision of high-end services for better-off patients and over-prescribing of drugs were common, leading to escalating medical expenditure. Accordingly, the core social functions of public hospitals have been neglected, such as provision of affordable access to quality medical services for the poor; provision of preventive health services and rehabilitation; and responses to public health emergencies. Patient dissatisfaction with hospital services has risen with increasingly deteriorated doctor-patient relationships (World Bank. 2010). Health insurance schemes exist to facilitate funding of treatment, however with limited impact on the reduction of out-of-pocket expenditure (Lei and Lin 2009; Sun et al. 2009).

The health reform in 2009 encouraged the public hospitals to reduce their reliance on drug prescriptions, through implementation of the zero price mark-up policy (by cancelling the additional charge of 15% of the drug cost). This policy intends to prevent profit making from drug sales and improve the rational use of medicines in public hospitals (Barber et al. 2013). On the other hand, the reform aimed to develop appropriate cost recovery mechanisms through increasing the consultation and service charges, with support of government funding to compensate the loss of revenues and mitigate the negative impact of such change on the patients (Barber et al. 2013). For instance, the Ministry of Health

argued that the medical consultation and service fees (e.g. nursing fees) were under-charged⁷, not reflecting the health workers' professional contributions and actual costs of hospital functioning in China. However, this reform does not necessarily change the legacy of China's market experiment and profit-driven hospital services (Blumenthal and Hsiao 2015).

The crisis and tensions between doctors and patients are increasing, as reflected in the increasing disputes between doctors and patients and even the incidents of workplace violence, such as physical violence and verbal abuse towards health workers in healthcare settings (Cai et al. 2011; Wu et al. 2012; Lancet 2014; Wu et al. 2014; Tucker et al. 2015). Several systemic factors account for the deteriorated doctor-patient relationships (Cai et al. 2011; Wu et al. 2012; Lancet 2014; Wu et al. 2014; Tucker et al. 2015). Patient-related factors include unsatisfactory treatment outcomes, long waiting times for short appointments, frustration due to high medical expenses and suspicion of expensive investigations or medications that might benefit the doctor or hospital more than patients themselves. Provider-related factors include provision of inadequate medical service quality, heavy workload, modest remuneration, perverse incentives based on fee-for-service system, insufficient communication with patients. Fundamentally, this problem can be explained as a consequence of the poor investment in health, and the failure to provide education on medical ethics and humanities. This problem was further flamed up with the media revelations of poor practices and suspicious relationships between doctors and the pharmaceutical industry (Cai et al. 2011; Wu et al. 2012; Lancet 2014; Wu et al. 2014; Tucker et al. 2015). With the doctor-patient relationship continuing to deteriorate (Lancet 2014), China is struggling to create a high quality, trusted, professionalised physician workforce (Blumenthal and Hsiao 2015).

⁷ For instance, the consultation cost for a doctor at middle-level professional grade was less than 10 Yuan per consultation at a county level hospital before the reform.

Therefore, understanding the prescribing behaviour among hospital-based TB clinicians will not only provide useful implications for the on-going implementation and scale-up of the integrated service delivery model, but also provide an interesting lens to examine the impact of broader health systems and new public hospital reform on service integration. To date, most studies of the integrated models in China are quantitative and descriptive, conducted from the patient perspective. They mainly focus on the implications of integrated service delivery on provider adherence to the national guidelines (e.g. non-standardised prescribing of TB treatment), and the associated costs, health systems delays and financial burden of the TB patients in the designated hospitals (Wei et al. 2013a; Wei et al. 2013b; Wei et al. 2014; Qiu et al. 2015; Hu et al. 2016; Huang et al. 2016; Jia et al. 2016). There is limited analysis of health systems components (e.g. governance, resources) and processes (e.g. culture) associated with integrated service delivery as compared to the international PPM-DOTS and hospital-DOTS studies. In most of the integrated model studies in China, financial incentives are commonly assumed to influence hospital providers' non-adherence to national guidelines and failure of the free TB care delivery in the designated hospitals. However, there are more implications of integration beyond the issue of financial incentives. As integration transfers the clinical responsibilities from the CDC to the designated hospital, this is associated with changes in management structures, resource allocation and organisational culture. These issues have not been explored in the existing studies on the integrated model of hospital-based TB care.

1.3 Aim and objectives

Aim

To apply systems-based thinking to understand providers' prescribing behaviour for TB in the context of integrated service delivery in designated hospitals in Zhejiang province, China.

Objectives

- To analyse the historical and policy-related contextual features of integrated service delivery for TB care within the designated hospitals;

- To assess the extent of non-free, non-standardised prescribing practices for uncomplicated TB cases in the designated hospitals;
- To analyse the influence of health systems components and processes on prescribing practices in the context of integrated service delivery in the designated hospitals

1.4 Theoretical framework

This study adopted a complex adaptive systems (CAS) lens to understand the context, extent, and processes of prescribing practices within an integrated model of hospital-based TB care. The CAS consists of interacting components with complex, non-linear interactions, enabling a capacity for learning and generating reactive or proactive adaptive behaviour (World Bank 2007). CAS provides a dynamic, organic and adaptive lens to study integrated service delivery systems. This study also follows Sheikh et al. (2011) in its emphasis on the interplay between the visible and quantifiable hardware of systems (i.e. building blocks) and the intangible software, such as relationships among system actors and the factors shaping such relationships (e.g., the ideas and interests, values and norms, and power and forces).

Accordingly, the study starts from the premise that the integrated service delivery system consists of a set of interconnected components of the health system hardware and software, with actors in the centre and dynamic interactions and processes simultaneously shaping the system. Bearing the research question in mind, and based on the literature review, an initial systems-based framework was developed to understand the prescribing behavior in the context of integrated service delivery (Chapter 3, Figure 3.1). The original framework evolved over the course of the data analysis. With the help of a causal loop diagram (CLD) (Chapter 9, Figure 9.1), it was iteratively fleshed out to show dynamic complexity in the health systems components and processes. The CAS features of the integrated service delivery system such as emergence, adaptation, feedback loops were identified with data emerging. The original framework was further refined on the basis of CLD analysis and presented in Chapter 9(Figure 9.2).

1.5 Brief description of methodology

This study employs a mixed-method, explanatory case study approach, in view of the research objectives. The case study approach, compatible with systems-based (CAS) thinking, allows for the holistic explanation of the social behaviour and phenomena, which are determined by a complex set of causes and adaptive behaviour. This study was conducted in Zhejiang, an affluent province located in the eastern coast of China. Zhejiang has 90 counties, covering a population of 54.77 million. It had a gross domestic product (GDP) of RMB63,226 in 2012 (as compared to RMB38,353 in China)⁸. Zhejiang province is selected, because Zhejiang provincial CDC has long-term collaboration with the research programme I was affiliated with during 2008 and 2016. Additionally, it is one of the pioneering provinces in China to have established the integrated model of TB service delivery. At the onset of the field work of this study in 2013, nearly all the counties in Zhejiang had implemented the integrated model for the TB service delivery.

Two designated hospitals based in the two different counties with different funding models for the TB clinics were chosen for the study: Yongjia and Cangnan. The two counties shared similar economic development indicators such as Average GDP per capita (RMB 27,125 vs 24,883 for Yongjia and Cangnan respectively); although the population in Yongjia is smaller than that of Cangnan (962,700 vs 1,299,900) in 2012⁹. The two counties also shared similar health systems indicators, such as percentage government spending on health (8.5% in both counties) in 2012. A brief description of the two designated hospitals are provided in Box 1.3 and 1.4.

⁸ Collected from the Zhejiang provincial and Chinese government communiques on economic and social development in 2012 (1USD=6.3 RMB approximately).

⁹ Collected from the local government communiques on economic and social development in 2012 (1USD=6.3 RMB approximately).

Box 1.4 Basic information of TB clinic in the designated hospital in Yongjia

In 2012, the TB designated hospital in Yongjia had 478 staff, with 300 inpatient beds. The hospital was rated as a secondary level hospital (Grade A). The TB clinic was set up in 2009, including 2 TB clinicians, 2 nurses, 1 pharmacist, 2 laboratory staff, and 1 register/cashier based in the TB clinic. The TB clinic was a relatively independent outpatient clinic with fixed TB staff, and coordinated by the public health department of the hospital. The designated hospital received the GFATM support from 2010 till 30 June 2012, which aimed to improve the quality of the newly integrated TB services. The designated hospital has received an annual earmarked funding of RMB800,000 from the government in the name of supporting TB control since 2010. In 2012, 763 TB patients were registered and treated in the TB clinic.

Box 1.5 Basic information of TB clinic in the designated hospital in Cangnan

In 2012, the designated hospital in Cangnan had 983 staff, with 600 inpatient beds. The hospital was rated as a tertiary level hospital (Grade B). The TB clinic was set up in 2011, including 2 TB clinicians, 2 nurses, 1 pharmacist, 2 laboratory staff, and 1 register/cashier based in the TB clinic. The TB clinic was affiliated to the infectious disease control department of the hospital, with TB staff regularly rotated from various departments of the hospital. The hospital received no similar funding for TB control, except the funding covered by the free treatment policy. In 2012, 700 TB patients were registered and treated in the TB clinic.

A combination of quantitative and qualitative methods was used, as informed by the critical realist approach- a worldview that is situated between positivism and interpretivism. This study started with a retrospective review of 340 medical charts of uncomplicated TB patients to understand the extent of non-free, non-standardised prescribing in the two designated hospitals under study. Based on the review results, 47 semi-structured interviews were conducted with health officials, TB/hospital managers, clinicians, radiologists, laboratory staff and nurses in the two counties. A purposive sampling technique was used to select information-rich cases (health systems actors related to integrated service delivery) for study. The fieldwork also included unstructured

observations of the working conditions and environment of the TB health workers, review of policy documents and administrative data related to TB control in the hospitals. These methods were triangulated with the patient chart review and semi-structured interview data. A thematic approach was used to formulate the initial coding frame, as guided by the conceptual framework. This coding frame was progressively updated, with new issues emerging throughout the analysis. Therefore, data analysis was both deductive and inductive, which helped to ensure themes were both theory and data driven.

1.6 Overview of the thesis

The thesis contains 9 chapters. Following this introduction chapter, in Chapter 2, I outline and provide justification for the health systems approach that was adopted to address my study objectives. This chapter first provides an overview of definitions of systems and systems thinking and reflection on the trajectory of health systems thinking. I then justify my choice of using complex adaptive thinking to inform this study after comparing it against mechanical thinking- a dominant approach in health systems thinking. To achieve this comparison, examples of conceptual and empirical applications of these thinking in LMICs are presented and the gaps of these studies are identified.

Chapter 3 presents a critical overview of health systems approaches to understanding the integration of TB services within the general health care services. This chapter first provides an overview of the concepts of integrating disease control activities into the general health care systems, as well as the history of TB service integration with the general health services. Using the framework of hardware and software of health systems, this chapter then summarises the broader literature on PPM-DOTS for TB control and the hospital-based DOTS studies in the LMICs, including China. The review findings are discussed in order to identify the gaps in the current literature on integrated service delivery for TB control.

Chapter 4 outlines and explains the research methodology employed in this study. This chapter first justifies the adoption of the critical realist approach- the underlying worldview of this study, in comparison with the other two main paradigms: positivism

and interpretivism. This chapter then justifies the choice of case study design and the mixed-method approach adopted for this study. The methods of data collection and analysis employed for the study as well as the ethical issues are discussed. This chapter concludes with the analysis of the influences of the researcher.

Chapters 5 to 8 present the study findings as guided by the conceptual framework. Chapter 5 situates the study within the historical and policy context of public hospital reform in China since 2009. The chapter provides an overview of the public hospital reform within which service integration occurred; history of the integration of TB service in the two hospitals, as well as the challenges of implementing public health activities in the two hospitals. Finally, the chapter discusses the financial performance and motivation related to TB control of the two hospitals under study.

Chapter 6 analyses the medicalisation of the public health problem in the designated hospitals, through the assessment of the extent of non-free and non-standardised prescribing practices of the TB doctors in the two hospitals, and the analysis of the rationales for the corresponding prescribing behaviour from the health provider's perspective. This chapter also discusses how the lack of clear guidelines for TB treatment influences prescription of ancillary treatment, and the influence of the changing context of care (e.g. the doctor-patient tensions) on providers' non-standardised prescribing behaviour. The chapter ends with analyses of the perceived consequences of TB doctors' prescribing practices on the patients' financial burden and case management.

Chapter 7 describes the working environment and conditions of the TB health workers in the designated hospitals, and examines how these will influence their job satisfaction and motivation. This chapter starts with the analysis of the professional motivation, perceived professional identity, discrimination and development of the TB health workers in the designated hospitals, followed by perceived infection risks and risk protection, satisfaction of and mechanism of payment, and priority setting for the welfare allocation in the designated hospitals.

Chapter 8 seeks to explain how the working relationships may shape clinical governance, which in turn, has influence on the prescribing behaviour of the TB doctors in the designated hospital. This chapter first analyses the inter-organisational relationships among Health Bureau, CDC and designated hospital, followed by the inter-departmental relationships within the designated hospitals where clinical TB care is delivered. The regulations related to the integrated service delivery are also discussed.

Chapter 9 brings together major themes emerging from the findings and relates these back to the specific questions this research seeks to answer. This chapter first discusses the contributions of this thesis to the theoretical and TB control literature. In line with the refined conceptual framework, I then discuss a number of key issues related to integrated service delivery that may influence the prescribing behaviour under study. The limitations of the study are acknowledged, before drawing out the practical recommendations to improve the integrated service delivery in China and other LMICs. This study concludes with possible avenues for further research.

Chapter 2 Systems and health systems thinking: history and approaches

2.1 Introduction

As discussed in Chapter 1, the aim of my thesis is to apply systems-based thinking(CAS) to understand the prescribing behaviour of TB doctors in the context of the recent move to integrate TB care within designated hospitals in China. The main purpose of this chapter is to build the case for the health systems approach adopted to achieve this study objective. In the next section, I will provide an overview of definitions of systems and systems thinking. This is followed by the brief reflection of the development trajectory of the health systems thinking. I will then compare two approaches of health systems thinking: mechanical and complex adaptive systems(CAS) thinking, and explain my choice of adaptive thinking to inform this study. A review of the literature applying CAS thinking in the health systems research in LMICs is presented and the gaps of the studies are identified.

2.2 Definitions of ‘systems’ and ‘systems thinking’

According to von Bertalanffy (1968, p159), a system is ‘a set of elements standing in interrelation among themselves and with the environment’. This and other definitions of systems share four common features: (1) having a group of elements- people, cells, molecules, devices or organizations forming a network; (2) the relationships and interactions between the elements, within their environment(in a open system); (3) interconnectedness making up a larger and unified whole; and (4) serving a common purpose and/or producing their own pattern of behaviour over time (Cordon 2013).

Systems thinking as a trans-discipline arose simultaneously from several scientific fields including biology, physics, management, and social sciences in the 1940s and 50s. Systems thinking to a greater extent responds to the failure of reductionism to cope with the complexity. Reductionists assert that a complex system is nothing but the sum of its parts and argue that the complexities in the world can be addressed through analyzing and reducing phenomena to their simplest components or factors (Jackson 2003). Systems thinkers assert that approaches to solving a complex problem by breaking it down into

smaller manageable elements are no longer sufficient to address the problems in this organic world, where things are inter-related. Systems thinking has a deep philosophical tradition, which can be traced back to Aristotle, who asserts the ‘the whole is not equal the sum of parts’ (Jackson 2003). A number of system thinkers further developed this idea. For instance, the biologist von Bertalanffy develops the open systems theory in the 1950s, which became very influential in the 1970s and 1980s. The open systems theory stresses the interaction between the living systems with the environment (Von Bertalanffy 1968). Norbert Wiener, another founding father of systems thinking as a transdiscipline, develops cybernetics. Cybernetics deals with general laws that govern control processes (Jackson 2003). In the 1960s Jay Forrester developed systems dynamic modelling (Forrester 1961), which was made popular by Senge (2004) in the 1990s. Systems dynamic modelling argues that the system emerges from underlying structures of flows, delays, information and feedback relations (Forrester 1961). However, the most important development of systems thinking is the birth of complexity theory or complex adaptive system, under the umbrella of complexity science, derived from non-linear dynamics, biological evolution and social systems in the 1980s. In complexity science, phenomena are situated at the ‘edge of chaos’, somewhere in between ‘order’ and ‘disorder’ (Jackson 2003).

2.3 Reflection on historical trajectory of health systems thinking

Health systems thinking has received increasing attention in the recent 20 years. However, the history of attention to health systems can be traced back to the mid-1960s and is linked to the history of international public health (Table 2.1). Development of health systems thinking has been context dependent, and is generally consistent with four major phases of global health development. Health systems thinking has evolved in line with prevailing paradigms and partly as a response to the very different needs of the international stakeholders who developed the relevant thinking (van Olmen et al. 2012a).

For instance, the introduction of vertical strategies in disease control was inherited from industrialised countries during the Cold War when the Soviet Union countries withdrew from the WHO in 1950s. The adoption of primary health care (PHC) between 1960s and 1970s responded to the failure of the vertical approach, while recognising the

comprehensive approaches to tackle social inequity and the wider determinants of health, but also benefitting from the general climate of optimism around personal and societal development.

During 1970s and 1980s, selective PHC was formulated in response to the criticisms of the unrealistic and idealistic concepts of the PHC, but also to the economic downturn, economic and social restructuring which weakened the health investment since 1970s (Cueto 2004). In 1980s health systems concepts such as sustainability principles became popular, again responding to the economic recession and restructuring in 1970s. However, it is worth mentioning that opposing factions between PHC and selective PHC co-existed from the late 1970s through to the present, although the positions of both factions have also shifted over time.

The 2000s witnessed the flourishing of health systems thinking. The rise of private foundations and Global Health Initiatives (GHIs) renewed the discussion of integration of disease control with health systems, or the ‘synergy’ between GHIs and local health systems. At the same time, WHO’s attention to health systems strengthening stimulated the thinking about health systems performance. Facing the challenges of MDGs implementation, WHO again facilitated the application of complex thinking for health systems strengthening (van Olmen et al. 2012a).

Table 2.1 Summary of historical development of health systems thinking

Period	Health systems thinking	Global/health context
1949-1956	Vertical strategies for disease control learnt from America and other industrialised countries	Cold war withdrawal of the Soviet Union and its allies from WHO membership; WHO more closely aligned with USA policy perspectives
1960-70s	Thinking beyond a medical and technical focus Awareness of management of health and health care resources Principles of community participation Alma Ata Declaration (1978) * and the ensuing 'Health for All'	Decolonisation in the south and economic growth and social revolution in the north A general climate of optimism around personal and societal development Failure of the yaws and malaria eradication campaigns Successful community-based initiatives in China and other resource poor countries Health services on WHO's agenda World Health Assembly called for attention for the development of rural health systems and general health services
Late 1970s-80s	Prioritising the 'Possible': selective primary health care (1979) * National and local sustainability as dominant health policy principles: 'Good Health at Low	PHC/Alma Ata criticised as 'unrealistic' and unattainable. 1973 oil crisis and the resulting global recession dampened enthusiasm for heavy investments

	<p>Cost', Bamako Initiative (1987, revitalising PHC)</p> <p>District as the organising unit for primary health care</p> <p>Paradigm of comprehensive PHC</p> <p>Health care delivery models (which can be traced back to Donabedian model in 1970s)</p>	<p>Macro-economic reforms and structural adjustment programmes - constrained social expenditure and development of an inclusive approach to health</p> <p>Resistance from health professionals and the lack of political will to implement social change programmes</p> <p>Steadily increasing role for the private sector</p>
1990s	<p>User charges, insurance, effective use of private resources, decentralization,</p> <p>Disability-Adjusted Life Year (DALY), AIDS as an exceptional paradigm</p>	<p>Globalisation, marketisation, the rise of AIDS, World Bank's Agenda for Reform published in 1987</p>
2000s	<p>Synergy of GHIs and local health systems</p> <p>Health systems performance</p> <p>Complexity thinking</p>	<p>Rise of private foundations and GHIs</p> <p>WHO's attention to health systems strengthening</p> <p>Challenges of MDGs implementation</p>

*Opposing factions co-existed from the late 1970s through to the present although the positions of both factions have also shifted over time.

Source: (Cueto 2004; van Olmen et al. 2012a)

Health systems thinking has generally moved towards a more comprehensive, holistic way of thinking. For example, strategies have evolved from the technically oriented vertical approach to disease control to the human right and comprehensive needs-based PHC (1950s-70s), to the selective PHC (late 1970s-80s). The health systems concepts were then extended to sustainability thinking (1980s), performance thinking (early 2000s) and complexity thinking (late 2000s).

However, during the earlier period until 1980s, there are few specific frameworks or models that can be clearly used for evaluative purposes. During the 1980s-1990s, a number of specific health systems frameworks emerged. These frameworks explicitly encompassed many of the holistic features of systems thinking, considering the complex and dynamic relationships between actors or between systems elements, even with the context. For instance, Roemer (1991) signals interactions among a set of five health system functions (management, resource production, economic support, delivery of services and organization of programme) that result in service delivery. WHO (1993) identifies four functions required in any health system (regulation, financing, resource allocation and service provision), as well as four agents (providers, patients, purchaser, government) and the relationships among them that underpin the functions, as well as the key institutions that shape these relationships: regulatory authority; payments by patients/population (economic incentives); and provider claims on financing agents (underpinned by rules). Frenk (1994) presents a more complex set of dynamics among elements of the health system (state, provider, patient/population, resource generators, other sectors), and between themselves and the external environment, e.g., public agencies. In addition to the actors' relationship, the framework also includes other software of health systems, for example, the prevailing sociocultural norms or consensus, which also shaped the relationship between the state and the population (Frenk 1994).

During the first half of the 2000s, health systems thinking shift largely to the functionalist and performance based approach. Examples of specific frameworks are the WHO 2000 health systems performance framework (WHO 2000), Robert's 'five control knobs' (Roberts et al. 2004), WHO's six building block framework (WHO 2007). However, the

relational and complex nature of health systems thinking does not necessarily appear to be stronger than that in the 1980-90s. It was not until the later 2000s that health systems thinking enters into a more sophisticated, complexity-based thinking that appreciates the interconnections between context, actors, elements and performance (de Savigny and Adam 2009). This paradigm shift is in recognition of the complex dynamic and adaptive nature of the health systems, whose behaviour is often hard to predict due to many interacting feedback loops, non-linear relationships, time delay, and unintended consequence, and their bi-directional interactions with contexts. The most important application is the systems dynamics or complex adaptive systems theory in health system research. However, compared with the historical development of systems thinking, development of health systems thinking has lagged behind. It was only about 20 years later that complexity science was more explicitly introduced to the health systems research.

During the 2000s, a number of disease related health systems frameworks also emerged in the context of the rise of GHIs. For instance, there are frameworks based on realist evaluation¹⁰ aiming to understand how the horizontal health systems factors influence and interact with the vertical, disease specific strategy normally (Atun et al. 2004; Coker et al. 2004; Mounier-Jack SM 2008; Hanvoravongchai et al. 2010). Based on the diffusion of innovation and CAS theory, Atun and colleagues propose frameworks to analyse how the interactions and interconnections between the innovation, innovators/adopters, communication process and the context, influence the rate and pattern of adoption of a targeted intervention to health systems (Atun et al. 2007; Atun et al. 2010).

2.4 Assumptions underlying health systems frameworks: mechanical thinking| vs. adaptive thinking

Health systems frameworks vary in purposes, concepts (elements, functions, processes, objectives), and terminology and taxonomy used for defining, describing, explaining and classifying health systems (Shakarishvili et al, 2010). However, different assumptions,

¹⁰ In the realist evaluation, outcomes (O) is achieved through the configuration of context (C) and mechanism (M) -the way by which a programme aims to influence the subject's actions.

perspectives, approaches or metaphors underlie different frameworks. Having discussed the evolution of health systems thinking (Section 2.3), this section looks into the health systems frameworks that were developed and elaborated after 2000, using two distinctive assumptions: mechanical thinking vs. adaptive thinking, to justify the choice of adaptive thinking that is deemed suitable to address the objectives of this study. Before moving to the discussion of adaptive thinking, I will first review the concept and application of the mechanical thinking, the currently dominating approach to health systems thinking.

2.4.1 Mechanical thinking

In this section, I will first discuss the concepts of mechanical thinking, followed by their conceptual and empirical application in health systems.

Concepts of mechanical thinking

A mechanical approach to health systems sees organizations and systems as hierarchical arrangements of defined universally valid components, where human behaviour complies with organisational change, authority and regulations. It usually has a reform focus. In mechanical systems, the results are predictable in response to a given stimulus, usually in great detail and under different circumstances. A mechanical system may be complex; like an automobile, it also involves with many interactions between different parts, however, it does not show emergent behaviour and neglects the local adaptation (World Bank 2007; Gilson 2012a). This section discusses three examples of health systems frameworks underlying this metaphor: the WHO 2000 health systems performance framework (WHO 2000), Robert's 'five control knobs' (Roberts et al. 2004), and WHO's six building block framework (WHO 2007).

Conceptual application of mechanical thinking in health systems

The WHO 2000 health systems performance framework appears in the 2000 WHO's *World Health Report on 'Health Systems: Improving Performance'*, which makes the well known contribution to the health system discourse. The report defines the health system as consisting of 'all organizations, people and actions whose primary intent is to promote, restore or maintain health (WHO 2000).' The report outlines four key functions of a health

system, i.e., resource generation, financing, service provision and stewardship, which drive the way that inputs are transformed into health system outcomes: health, responsiveness and fairness in financing (World Health Organisation 2000). This framework was quantified to compare the health systems performance around the world, which caused controversy. Based on the WHO 2000 health systems performance, Roberts et al. (2004) propose a model derived from the industrial organization economics, where health systems are structured by state actions or non-actions, and evolve to serve societal needs. In their model, a health system is conceptualized as a set of relationships in which five critical structural components (means), or ‘control knobs’, financing, payment, organization, regulation and behaviour, are causally connected to the intermediate and final goals (ends)’. Although these ‘knobs’ seem to be similar to the functions of other frameworks, they are perceived ‘power mechanisms’ or policy tools which actors can use to adjust the health system and generate measurable changes in system outcomes. WHO (2007) in its report *‘Everybody’s Business: Strengthening Health Systems to Improve Health Outcomes’* defines six ‘building blocks’ that make up the health system: service delivery; health workforce; information; medical products, vaccines and technologies; financing; and leadership and governance. The framework provides a simplified and useful means and common language for policy makers and researchers to locate, describe, classify and monitor health system constraints and investments. Specific indicators and measurements have been proposed for monitoring the building blocks of the health system to assess a country’s health system performance in *Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies* (WHO 2010). The measurements are based on a model which rearranges the six building blocks, to illustrate how health inputs and processes (e.g. financing) contribute to the outputs (e.g. interventions quality), outcomes (e.g. prevalence) and impact (morbidity and mortality) (WHO 2010).

These three frameworks prescribe a set of parts or components, and except the WHO six building blocks, the other two frameworks perceive the parts or components to be interacting in complex ways to generate certain characteristic behaviour. For example, the WHO 2000 framework presents a dynamic picture of how health systems functions are

configured to produce health. Like macro-economics, the ‘control knob’ framework emphasises the system-wide analysis rather than individual- or firm-level behaviours, and concentrates on the final goals and five ‘control knobs’ that are interacting to impact the performance. These frameworks represent the relational and complexity aspects of health systems to some extent. However, they tend to neglect the ability of local learning and adaptation and emergence of health systems behaviour from the environment and agents.

First, these frameworks tend to rely on a top-down approach and authority in health reform and implementation. Robert’s ‘control knobs’ metaphor¹¹, for instance, suggests the role of a central authority in the possibility to steer a system (Roberts et al. 2004). WHO’s six building block framework assumes that health systems strengthening means addressing key constraints in each of these blocks (WHO 2010). As compared to the ‘control knob’ framework and WHO 2000 framework, this creates an even more static effect and mechanical isolation of effects, neglecting the dynamic process and outcome aspects of health systems, thus hindering the understanding of impacts on systems as a whole (van Olmen et al. 2012b; Mounier-Jack et al. 2014). This again represents the reductionist approach to health systems strengthening.

Second, the neglect of emergence and local adaptation in these frameworks is due to the adoption of the conventional evaluation approach, which follows the linear logic of ‘input-blackbox-output’. Despite their tendency to see health systems as a ‘whole’ by linking the processes (functions, policy tools) to outcomes, these frameworks do not indicate any feedback and responses between the outcome and functions (or processes and inputs) and the contexts of the health systems. Such simplistic analysis of situations will miss or overlook the most important sources of the problem and fails to identify the key determinants, the synergy and emerging behaviour and contexts that explain the overall success or failure of the programme. Design of interventions and policy actions based on

¹¹ WHO’s building block and Roberts et al.’s control knobs may also reflect the economic perspective, which underpins the role of economic incentives, market, price (van Olmen et al. 2012a).

the linear logic often neglects the ‘spill-over’ effect of interventions on other building blocks, causing unintended consequences or ‘policy resistance’.

Thirdly, these frameworks commonly lack emphasis on the context within which social systems (including health systems) are embedded. For instance, despite the WHO 2000 framework illustrates the formal architecture of the health systems, it does not capture factors outside the health system that will influence the performance, such as organization of other social activities. The ‘five control knob’ framework is also devoid of the consideration of unique historical, cultural and political contexts.

Examples of mechanical thinking in health systems research

Given the dominance of a mechanical perspective of organizational functioning within existing frameworks, this section provides a few examples of the studies that espouse this type of thinking and approach to the health system.

Examples of empirical applications of health systems

Health systems studies that espouse a mechanical approach often present the characteristics of factorial, static, linear and reductionist thinking. Some studies have simply followed the building blocks, or only identified the emerging themes related to the building blocks. For instance, my earlier studies before receiving this PhD training fall into this category. In an earlier qualitative study of understanding the factors influencing the integration of TB service in the designated hospital in China led by myself, we considered historical and technical context as key to explain the integration of TB service in the hospitals. However, we have assumed that improving the quality of integration would mainly rely on the improvement of resource allocation, staffing and incentives, management and technical coordination, without interrogating the relationships of these factors (Zou et al. 2012). Similarly, another recently published qualitative study also compared two common public models of community health centres (CHCs) in China, i.e., the ‘government-managed’ CHCs and the ‘hospital-managed’ CHCs. Guided by the WHO health systems framework, the study found that the government-managed CHC model presented more simplified but accountable structure, associated with better financial

transparency, community health workforce, funding and priority for public health service delivery as compared to the hospital-managed CHC model, although both models faced common challenges of staff retention (Zou and Wei 2017). These studies neglect the dynamic process and outcome aspects of health systems hindering the understanding of health systems as a whole.

Other studies attempt to depict the dynamic relationships of the building blocks; however, they fail to explore the emergent and adaptive properties of the systems. For instance, Mutale et al. (2013) assessed the baseline performance of WHO six building blocks before the implementation of 'Better Health Outcome through Mentorship and Assessment (BHOMA)' in Zambia. The study identified the supply side and demand side barriers to health systems strengthening in line of the WHO six building blocks, and identified the linkages between service delivery and other health systems building blocks. Webster et al. (2013) examined the ineffective processes through the six health systems building blocks in the delivery of intermittent preventive treatment with sulphadoxine-pyrimethamine (IPTp-SP) insecticide treated nets (ITNs) to pregnant women through antenatal clinic in Mali. They found that the failure of service delivery was partly related to the interventions, and partly due to the failure of building blocks (as context), such as financing and product and supply chain management, which were overlapping and connected to some extent (Webster et al. 2013). Despite the evidence of some level of relational and complex thinking in these studies, they tend to view health systems as 'machines', where parts are well assembled and organised to interact to produce outputs.

Other studies aim to identify the factors influencing the policy implementation, but they have explicitly adopted the input-process-output logic. Probandari et al. (2008) conducted a multiple-case study to assess the quality in implementing PPM-DOTS strategy in hospitals in Indonesia. Using Donabedian's model that includes the linear connections between structure, process and outcome, the study revealed the importance of process, i.e. mainly commitment and case holding process, to the treatment outcomes (e.g., success rate). The study concluded the importance of systemic approach and structural support, process improvement from the hospital in the implementation of DOTS strategy

(Probandari et al. 2008). Kress et al. (2016) used the Primary Health Care Performance Initiative Conceptual Framework that follows the 'systems-inputs-service delivery-output-outcome' logic to identify key factors contributing to underperformance of PHC in terms of the output (e.g. intervention coverage) and outcome (e.g., mortality). Using a variety of data sources, the study found that challenges in systems, particularly health financing and governance, were the root of input and service delivery challenges, which contributed to the underperformance of the PHC system in Nigeria (Kress et al. 2016). Both studies have adopted the Donabedian's model and Primary Health Care Performance Initiative framework, which in general reflect a structure similar to the commonly used linear logical model of input-process-output-outcome, leading to the simplified understanding of the health systems.

In summary, mechanical thinking in health systems research is reflected in a tendency to depict the system as static, linear and reduced to functional components. However, in some cases, relationships and complexity are mentioned, but without consideration of the emergent or adaptive behaviour of the health systems components or actors.

2.4.2 Adaptive thinking: complex adaptive system (CAS) theory

In this section, I will first present the adaptive thinking approach to health systems, which has been mainly informed by complex adaptive system (CAS) theory. I then discuss its conceptual and empirical application in studies of health systems.

Concept of complex adaptive system

The CAS consists of interacting components with complex, non-linear interactions. The CAS has diverse components which have a capacity for learning to generate reactive or proactive adaptive behaviour (Plesk and Greenhalgh 2001; World Bank 2007; de Savigny and Adam 2009; Cordon 2013). Health systems can be viewed as complex adaptive system, where health outcomes are not merely the sum of physical inputs, human resources, organizational structure, and managerial processes. CAS also recognizes the existence of hierarchies, and has interconnected actions of the parts of a system. However, this approach emphasises the networks, and layers of complexities, and the freedom,

capacity and ability of the system to learn to adapt, through self-organization, learning, and reasoning, as a response to different stimuli in its environment in unpredictable ways (Plsek and Greenhalgh 2001; World Bank 2007; de Savigny and Adam 2009; Cordon 2013). CAS has a number of hallmarks such as simple rules, networks of adaptive agents, feedback, self-organization, and emergence (Plsek and Greenhalgh 2001).

- Adaptation: a complex system and its agents can adapt its behaviour to the context over time but such adaptation can lead to better or worse outcome as perceived by different people.
- Internal rules: adaptation is based on the instincts, constructs, and mental models, which drive their actions. These may not be explicit, fixed or even logical when viewed by another agent.
- Emergence: the interactions among the agents cause the emerging behaviour. This is how the CAS system reflects the holism of systems thinking as the emergence cannot be divided into parts. On the contrary, mechanical or reductionist thinking does not have the ability to account for surprise, creativity, and emergent phenomena.
- Self-organisation: order, innovation, and progress can emerge naturally from the interactions through simple locally applied rules without being imposed centrally or from outside.
- Feedback loops: social systems contain many interrelated networks of feedback processes, both self-reinforcing (positive) and self-correcting (negative or balancing). Any unintended results could have arisen from inadequate understanding of the structure of the feedback loops in the intervention and policy design. Causal mapping or casual loop diagram (CLD) helps to generate the greater understanding of the phenomenon.
- Path dependency: history matters in decision making.
- Tension and paradox: interactions among agents naturally leads to tension and paradox that can never be fully resolved. CAS appreciates different values and tensions and believe the seemingly opposing forces can work together in positive ways.

- Inherent non-linearity: the simple input-output relationship does not apply to the CAS. Changes in the output are not proportional to the changes in the inputs, and small changes in the initial conditions can trigger huge and long-term impact on the system.

Conceptual application of CAS in health systems thinking

This section discusses a few examples of health systems thinking frameworks emerging since the late 2000s that have adopted the principles of CAS.

Atun (2012, p. iv4) defined health systems as ‘open systems, with interlinked components that interact within the context within which the health system is situated, thereby forming a whole with properties beyond the component parts. Interacting elements influence each other with positive (amplifying) or negative (balancing) feedback, collectively determining the system’s behaviour’. These concepts are well reflected in their health systems framework articulated in the late 2000s (Atun and Menabde 2008). In addition to these dynamic relationships, this framework specifies the four health systems ‘levers’- stewardship and organizational arrangements, financing, resource allocation and provider payment systems, and service provision that will help to achieve intermediate objectives and goals (Atun and Menabde 2008). The framework enables a broader, more sophisticated and dynamic analysis of the context and health system elements, to better predict the effect and sustainability of the disease control programme. Although this framework emphasises the dynamics and feedback loops of the health systems that are important features of CAS, it does not explicitly clarify the role of actors in the health system.

de Savigny and Adam (2009) reconceptualise the WHO six building blocks framework. They suggest that the building blocks alone do not constitute the health system; but ‘it is the relationships and interactions among the blocks – how one affects and influences the others, and is in turn affected by them – that convert these blocks into a system (de Savigny and Adam 2009, p31).’ In the meantime, it places the role of people in the centre, not only as mediators and beneficiaries, but also as actors driving the system. Overall, the

framework explores the complex character of health systems, the interactions and feedback loops between the building blocks, actors and context, and the intended and unintended consequences of interventions (de Savigny and Adam 2009).

Sheikh et al. (2011) recognise the influence of economic theories of markets and political institutionalism on the formulation of complex health systems. They contend that complex health systems concern non-linear and dynamic relationships between different parts of health systems, but also the interplays between the intangible software such as the ideas and interests, values and norms, and power and forces that shape relationships among system actors, and the visible and quantifiable hardware of systems (i.e. building blocks) (Sheikh et al. 2011). Compared to other frameworks, this framework clearly manifests the interactions between the hardware and software elements in the health systems.

Van Olmen et al. (2012b) develop a health systems dynamics framework that include 10 specific elements, including WHO's six building blocks, context, value and principles, population, goals and outcome, as well as their dynamic interactions. Different from the other frameworks, the framework brings values and principles as an underlying steering mechanism and helps to analyse interactions and equilibriums within a health system (van Olmen et al. 2012b).

Compared to frameworks adopting mechanical thinking, these frameworks represent a more organic approach to health systems and offer new insights into the complex and relational nature of health systems. In general, these frameworks appreciate the interrelationships between the health systems blocks, actors, as well as their relationships to a functioning whole, often understood within the context of an even greater whole. Some frameworks do not explicitly present actors, e.g., Atun's framework (2008), while others consider actors, values and principles, relationships (software) alongside the building blocks (hardware).

Main features of CAS as applied to empirical health systems studies

Given the strengths of adaptive thinking, the present study adopts the CAS perspective, and in particular seeks to combine an analysis of both hardware and software elements of the health systems in the CAS. This approach allows for consideration of the health system as a social system. This will shift away from the mechanical focus of health systems thinking on blueprints, detailed plan, searching correct building blocks, functions and tools to a more adaptive and organic thinking to provide a stronger power of explanation of health system problems. This section discusses a few examples of studies applying the CAS thinking in empirical health systems research studies, and examines whether and to what extent the software components of health systems are combined with the hardware components in these studies.

Application of systems thinking, including CAS, has become increasingly popular in health systems studies in recent years in LMICs, including China. For the purpose of this thesis, I will only focus on the empirical studies closer to the topics of this thesis, such as (integrated) service delivery. This means that despite the fact that some studies adopt the CAS concepts to health system issues, they will not be included in this discussion. In fact, a number of studies conducted in China use the CAS to understand a variety of health systems issues in China. For instance, Xiao et al.(2013) used the lens of CAS to examine implementation of the essential drugs policy in three rural Chinese counties. Zhang et al. (2014) applied the concepts of adaptation originated from CAS theory to analyse the pathway of development of China's new rural cooperative medical scheme over 35 years. However, these two studies are not so much related to the topic of this study. Some studies seem more relevant to this thesis. For instance, Weeks et al.(2013) generated a qualitative dynamics model through re-conceptualization of the evaluation data of a multilevel intervention conducted to promote female condoms for HIV/sexually transmitted infection (STI) prevention among Chinese women in sex work establishments. Li et al. (2014) constructed a system dynamics model to address the high level of pharmaceutical fees for patients in Chinese hospitals. Wang et al. (2016) used the CAS lens to investigate the implementation of the antibiotics regulations in China. However, these studies are not

empirical studies but are modelling, review and debate articles. Criteria of included literature and the search strategy are outlined in Appendix 2.1.

In total, 12 studies are included for discussion, which were conducted in a number of LMIC countries, including Zambia (4), China (3), India (1), Burkina Faso (1), Ghana (1), Nigeria (1), and Uganda (1). The selected studies relate to delivery of health services and interventions for TB, malaria, HIV/AIDS, eye health, general health services, immunization, provider behaviour and practices. Most studies explicitly clarify their study design as case study. The remaining are policy, service or programme evaluation, although not clearly specified. Most of the studies employ more than one method, such as in-depth interviews and focus group discussion. Almost all of the studies have strong qualitative components, but only four studies employ mixed-methods of qualitative and quantitative approach. The main objectives, methods and key results of these studies are summarised in Appendix 2.2.

The ability of the studies characterizing the human interactions or health systems software vary between the studies. Informed by the WHO's systems thinking framework (de Savigny and Adam 2009), some studies aim to understand the impact of system-level interventions on building blocks. Health systems building blocks are systematically examined through and fleshed out to address the research questions. For instance, Mutale et al. (2017) analysed the system-wide effects of a complex health system intervention in Zambia- 'Better Health Outcome through Mentorship and Assessment' (BHOMA), which aimed to improve service quality. Inspired by the WHO's systems thinking framework (de Savigny and Adam 2009), Mutale et al. (2017) aimed to identify the mechanism and systems-wide effect of the BHOMA intervention. With the help of the CLD diagram, they illustrated the potential effect of context and its interaction with building blocks (Mutale et al. 2017). While this study provides systematic and dynamic understanding of the health systems impact, there tends to be limited exploration and emphasis on 'health systems software' such as values, trusts and power dynamics of actors in driving the changes or performance. Informed by the WHO's systems thinking framework (de Savigny and Adam 2009), Yaya Bocoum et al. (2013) categorised the health systems effects of task shifting

for HIV in Burkina Faso into supply side and patient side factors. Unlike the above study, this study identified many effects on the health systems software, for instance, staff motivation and performance, job satisfaction, relationship between doctors and other staff, professional protectionism, staff frustration (supply side); patients satisfaction with services received by lower cadres (patient side)(Yaya Bocoum et al. 2013). In studying the health systems effects, both studies identified the positive effects and the negative, unintended effects (Yaya Bocoum et al. 2013; Mutale et al. 2017).

Other studies do not only consider the building blocks in their conceptualization of the study, but explicitly integrate the components of hardware (e.g. building blocks) and software (e.g. values) in their framework and analysis. The interpretation of hardware and software, and their dynamics relationships, depend on the questions of the studies. Some studies well integrate their hybrid analysis of the hardware and software with the CAS hallmarks such as emergence, self-organising and dynamic impacts. For instance, Barasa et al. (2016) found that consistent with CAS features, the weaknesses in hospital system hardware (e.g. resource scarcity) and tangible software (e.g. bureaucratic inefficiency) resulted in the self-organization of the hospital systems to respond to multiple environment pressures through revenue maximizing behaviour (emergent property). The capacity for revenue generation became one of the important forces influencing priority-setting practices of resource allocation at the hospital level in Kenya (Barasa et al. 2016). Topp et al. (2015) applied the Mechanisms of Effect framework to assess the impact of HIV service scale-up on mechanisms of accountability in Zambian primary health facilities. This framework underpinned the dynamic influences of health systems hardware (i.e. building blocks) and software (e.g. trust and power relationships) on the accountability and trust. The study identified the non-linear, short-term influences of the investments in the health systems hardware and software on the administrative accountability (e.g. internal management) and social accountability (e.g. provider-patient relationships) in the HIV departments (Topp et al. 2015).

Other authors demonstrate the dynamic relationships between hardware and software of health system in their framework but have limited attention of software of health systems.

For example, Bozzani et al. (2014) conducted health systems analysis of eye care services towards VISION 2020 goals in Zambia. Using a health system dynamics framework (van Olmen et al. 2012b), the authors observed the underperforming eye health system in all key areas of the framework, and the dynamic relationships between the framework elements. For instance, lack of resources (physical, financial and informational) negatively affected leadership and governance, hindering the delivery of eye health services to the population. These factors have collectively contributed to the failure of the eye health system to fulfil its values and principles (software elements) of ensuring equitable access to eye care (Bozzani et al. 2014). Informed by the open system theory, Zou et al. (2015) developed a framework to illustrate the dynamic relationships between the health systems context, the processes, which included maintenance (e.g. values), management (e.g. supervision) and technical sub-systems (e.g. technical support) and outcome of such collaboration. Guided by this framework, this study demonstrated how the different values of the TB programme and general hospital providers were shaped by the different funding natures of the two institutions; and how the management of the collaboration was shaped by the prevalent medical and relationship cultures in China (Zou et al. 2015).

While the above studies focus on the health systems building blocks, or their interplay with the software of health systems, most of the studies provide dynamic analysis and exploration of the mechanisms of policy implementation or human behaviour. The studies either use CAS or at least systems dynamics, one of the main features of CAS, to explain a defined health system problem.

The studies that explicitly use CAS often emphasise the network of the numerous agents and their interactions and relationships or other health systems software (e.g. trust), and how they learn from external environments and adapt to the changes happening in systems. In this case, they do not tend to use CLD or feedback loops. For instance, Zhou (2015a) assessed the implications of implementing contract service policy on the delivery of public health services and explored the influencing mechanisms in China. They demonstrated that the successful implementation of basic public health service benefited

from the positive dynamics and supportive cooperation among the actors between the health providers (township hospital, village clinics), demanders (rural residents) and local government. Success of the policy implementation was also attributed to these agents' mental models shaped by larger health, economic, historical and political systems of the society, where the public health systems were embedded (Zhou et al. 2015a). The authors identified villagers' trust of medical abilities of the village doctors and the government as a potential factor influencing mechanism of public health services delivered under the contract service policy (Zhou et al. 2015a).

Tang et al. (2017) compared their cooperative behaviours from both organizational and inter-professional levels among the community health and hospital services before and after the integrated care reform in Qianjiang, China. It was found that the integrated care reform did not achieve its desired effect of improving continuity of care. The health organizations and services were only loosely integrated, while the cooperation levels between organizations and professionals remained low. This was reportedly due to low mutual trust among the health organizations, mainly due to poor financial incentives, lack of sustainable cooperation mechanism, and an effective communication platform (Tang et al. 2017). Unlike most of other CAS studies that used a qualitative approach, this study used questionnaire survey to evaluate cooperative behaviour among the health systems actors.

Other studies do not aim to study the actor relationships and interactions but often apply feedback loops or CLD diagrams to explain the health systems problem under study. The casual loop helps to visualize the complex system patterns and characteristics, such as policy resistance, feedback, and adaptation in the health systems. It also illustrates the events, actors, and interactions, or the underlying mental model that fosters the emergence of systems behaviour. For instance, with the help of a causal loop diagram, Paina et al. (2014) illustrated the evolution of the dual practices of the public providers in Kampala Uganda. From 1990s until nowadays, for instance, dual practices have emerged as a frequent coping mechanism of the doctors working in the public sector, in the context of private sector growth and increasing population demand. The public sector offered low

salary for physicians, while the private practices provided significant earning possibilities. However, physicians were reluctant to leave the public sector, which provided job prestige and stability (Paina et al. 2014).

In Kerala, India, Varghese et al. (2014) identified various CAS phenomena such as phase transitions, feedback, path dependence, and self-organization, which influenced the change in vaccination coverage in the two districts. The authors described the role of authorities in increasing vaccine acceptability in the phase of declining immunization coverage, where highly connected actors were exerting disproportionate influence over household vaccination decisions in India. They revealed that trust played an important role in shaping the interactions of actors such as citizens, religious leaders, allopathic professionals, Kerala Government Medical Doctors' Association, contributing to the CAS phenomenon (Varghese et al. 2014).

Using the systems dynamics analysis through participatory group model building, Ager et al. (2015) explained how the service provision was threatened by the crisis to influence the service quality; and how health systems actors adapted and responded to the crisis to maintain the service functioning in the Yobe State, Nigeria. For instance, the authors illustrated the dynamic relationships among health systems hardware (e.g., financial resources) and software (e.g., community cohesion, staff commitment and motivation) that influenced the service adaptation and functioning (Ager et al. 2015).

In general, these studies tend to have stronger emphasis on the human elements, interactions or 'health systems software'. On the contrary, other studies adopt feedback loops, however, they tend to be less organic as they rarely engage human elements to explain the health systems phenomena. For instance, using systems dynamics and feedback loops, Agyepong et al. (2014) identified non-linear, indirect relationship between provider payment method and incentives of providers to see more active insurance cardholders or provide more inputs (drugs) per client. The study suggested that, the wider national context, together with the characteristics of the health system where the

provider payment method was introduced, had contributed to shaping and modifying supply behaviour and incentive (Agyepong et al. 2014).

Overall, studies adopting CAS principles have great potential to capture the dynamic factors and their interactions to explain the health systems problem. Studies mainly focusing on the dynamics of the building blocks are clearly the most straightforward way of evaluating the systems-wide effect of health systems interventions. However, this may risk neglecting exploration of the health systems software and human interactions. Integrating the hardware and software components of health systems during the conceptual stage helps to ensure that data related to these two components are collected and analysed. There is an increasing trend of health systems studies applying CAS theory and this provides more open and dynamic exploration and great potential to explore the human interactions and software of the policy implementation. However, this cannot ensure that the hardware and software components of health systems are both addressed at the same time.

2.5 Conclusion

Complex adaptive system is receiving increased attention in health systems research conducted in LMICs. Compared with the more predominant mechanical approach to health systems, CAS provides a dynamic and adaptive lens to study health systems by linking context, actors, building blocks, processes and outcomes. However, few studies have been identified that apply CAS approaches to the study of integrated service delivery for TB and other infectious diseases in the LMICs. In particular, it is worth exploring how to explicitly embed the hardware (building blocks) and software (power relationship, culture, values, etc.) in the CAS studies, as CAS theory itself only provides the broad concepts and ways of thinking.

Chapter 3 Integration of TB control within the general health sector in LMICs

3.1 Introduction

Integration of a public health programme into the hospital brings a number of changes for the TB service delivery in the designated hospitals in China. Integration not only means the transfer of the responsibilities from the CDC to the designated hospital, but also involves the change of management, resource allocation and even organizational culture. For instance, when the TB service is delivered by the TB programme, the CDC itself manages the clinical service and resources and practice based on the national guidelines. Following integration, service delivery is jointly managed by both the hospital and the CDC. The CDC needs to transfer the free treatment resources to the designated hospital, and in particular, the hospital has to reallocate the human resources to work for the TB control. TB service is no longer delivered in the public health environment but the medical establishment. The main purpose of this chapter is to provide a critical overview of health systems components and processes to the integration of TB services with the general health sector. I begin with the overview of the concepts of integrating disease control activities into the general health care systems as well as the history of TB service integration with the general health services. I will then summarize the broader literature on PPM-DOTS for TB control in the low-and-middle income countries¹². This section is then followed by the specific review of hospital-based DOTS studies in the LMICs, including in China. The review findings are discussed, in order to identify the gaps in the current literature on integrated service delivery for TB control.

3.2 Integration of disease control programme with the general health services: towards a holistic approach

The term ‘disease control programmes’ is interchangeably and confusingly used with ‘vertical approach’ ‘stand-alone programme’, ‘categorical, disease management’. In this thesis, I define the disease control programme as including two dimensions. First, a

¹² Despite the different nature between the private practitioners and hospital sector (the focus of this study), it is important to review the experiences of the public-private partnership to broaden the evidence base of the integrated service delivery in TB control.

disease control programme is ‘a coherent set of activities conceived to control, possibly eliminate, a given disease’ (Cairncross et al. 1997). Second, a disease control programme is as ‘an institution, with a specific administration, scientific and technical staff, and logistical and financial resources to control one particular health problem’ (Criel et al. 2004). A disease programme has strong central administrative, technical and financial control, with defined and focused objectives for specialised services and rapid response ability, and so is attractive to external donors (Cairncross et al. 1997; Mills 1983; Criel et al. 2004; Atun et al. 2008). However, lack of integration of disease control programmes with general health services can cause duplication of services, inefficient care delivery and fragmentation of the health system, ineffective use of resources, creating high opportunity costs for health services and even the failure of disease control (Atun et al. 2008).

Against this backdrop, there is an increasing call for the integration of disease control with the general health care system. Integration means different things to different people. The term ‘integration’ is also interchangeably used with other terms such as ‘integrated service delivery’, ‘integrated programmes’, and ‘horizontal service delivery’. In defining integration, some authors emphasise the collaboration and coordination of disease control and general health care facilities. Other authors emphasise the service delivery by the multipurpose general health care facilities from administrative and organizational perspectives (Box 3.1). In this study, this broadly refers to the integration of the public health practices and/or disease control activities, such as diagnosis and treatment and management, into the general health services.

Box 3.1 Examples of concepts of integration

Definitions emphasising the collaboration and coordination of disease control and general health care facilities. For instance,

- Unger et al. (2003, p.28) define integration as ‘a process where disease control activities are functionally merged or tightly coordinated with multifunctional health care delivery’.
- WHO (1996, p.4) defines an integrated programme as ‘the process of bringing together common functions within and between organizations to solve common problems, developing a commitment to shared vision and goals and using common technologies and resources to achieve these goals’.

Definitions emphasising the service delivery by the multipurpose general health care facilities from the administrative and organisational perspectives. For example,

- Criel et al. (1997) suggest that in the integrated care delivery, the multipurpose general health services undertake the responsibility to implement specific activities designed to control a health problem as part of the broader package of activities; while the disease control programme uses this channel or platform to implement its activities (Criel et al. 2004).
- Atun et al. (2008) emphasize that in the integrated model, services are typically delivered through health facilities that provide routine or general health service, without separate administration or budgets.

3.3 History of TB service integration

Vertical and integrated approaches have evolved through the history of TB control (Table 3.1). The history of integrating TB services in the general health services reflects the path-dependency and learning processes of global TB control policies. The vertical TB approach (1948-63) was initially applied based on the experiences of industrialized countries. However, this had limited success due to the high cost of implementation. Recognizing the essential role of general health services, TB service was integrated into general hospitals (1964-76). This has generated mixed TB control results and facilitated by the PHC movement, the managerial functions of TB control were integrated to improve the efficiency (1977-88).

However, managerial integration has caused an unintended consequence of deteriorating the quality of case finding and management, due to the weaknesses of hospital providers in supervision and training. This period coincided with the rise of HIV/AIDS, which worsened the TB epidemic, particularly in countries undergoing economic crisis, as for example, the former Soviet Union. Globalization of health sector reform further pushed the managerial integration without involvement of TB control experts. During this period, many international organizations lost interest in TB control. The revised TB control strategy called DOTS emerged to respond to the emergency of TB control. This required the retreat from the managerial integration theory and TB control returned to the centralized specialized management approach similar to that of the 1960s, although with new TB control technology (DOTS). Integration with general (primary) health care remained at the service level (1989-98). However, DOTS expansion turned out to be challenging, which triggered the PPM-DOTS movement since 2000s. From 2000 onwards, the rise of global health initiatives such as GFATM helped to bring the TB control back to the international agenda. PPM-DOTS, together with other components of Stop TB Strategy, have helped to achieve the target of MDGs to halt and reverse the TB incidence by 2015 (WHO 2015). The WHO End TB Strategy as part of the SDG again supports a strong coalition with civil society organizations and communities, and the implementation of the integrated, patient-centred TB care and prevention (Uplekar et al. 2015)

Table 3.1 Historical development of TB control policies

Period	Management policies	Model	Implementation outcome and drivers for next change
1948–63	The vertical approaches of the early days	Mass programmes, satellite clinics	Largely failed in poor countries due to the high cost of running; recognition of the essential general health services
1964–76	TB service integrated into general health service	General health services provided simplified and standardised treatment of TB: TB programme provided specialised managerial functions (vertical activity, e.g. training, supervision logistics)	No significant improvement; assuming the need to integrate managerial functions; coincide with the primary health care movement pushing managerial integration
1977–88	Integrating managerial functions to general health services	TB staff only provided technical guidance; managerial functions integrated; to improve the efficiency	Deterioration of the quality of case finding and treatment; economic crises, weakening the public-health infrastructure; many international organizations lost interest; health sector reform pushed managerial integration without TB managers involvement; HIV

			epidemic worsened TB; DOTS as a cheap and mass administration approach
1989–98	Revised TB management approach labelled as ‘DOTS’, requiring a specialised managerial approach	Managerial functions at central, regional, and district levels, retreat from the managerial integration theories; integration of case-management delivery into the primary health care infrastructure remained.	Global TB programme come back expanding the DOTS coverage in the countries turned out to be very challenging.
early 2000s	PPM-DOTS	As part of the Stop TB Strategy Partnership and multisectoral approaches	Achieving the target of MDGs to halt and reverse the TB incidence by 2015
From 2015	Integrated, patient-centred TB care and prevention	As part of the End TB Strategy	

Source: adapted from (Raviglione and Pio 2002).

3.4 PPM-DOTS: the international experiences

This section reviews twelve international studies (See Appendix 3.1 for selection criteria and search strategy). Most of which were conducted in India, where the private sector played a significant role in managing the TB patients (Atre 2016). The objectives of the study varied, including evaluation of the outcome of PPM-DOTS on case detection and treatment, the process of PPM-DOTS, and understanding of the views and perception of different stakeholders. A variety of study designs were used, including cross-sectional design, quantitative retrospective cohort study, mixed-method multiple-case study and qualitative study (Appendix 3.2). Most of the PPM-DOTS literature is operational research by nature. Only a limited number of studies have conceptualized the PPM-DOTS using theoretical perspectives or frameworks (Kielmann et al. 2013; Engel and van Lente 2014)

3.4.1 Relationships between the public TB programme and private/health practitioners in PPM-DOTS

Many of the PPM-DOTS studies highlight the interconnectedness of different stakeholders and relationships, representing the crucial role of social relationships within the health system. For instance, informed by a political discourse of clinical governance, Kielmann et al. (2013) framed a number of working relationships: *service relationships*, i.e. TB Health visitors and patients; *organisational relationships*, i.e. TB HV and supervisory structures; *inter-organisational relationships*, i.e., TB Health visitors and PPs in western Maharashtra, India. PPM-DOTS is often premised on an ‘equal’ relationship between or among partners whereas this is rarely the case in reality. Neglect of the working relationship among significant actors on the ground can cause mistrust among these actors, representing conflicts, suspicion, poor referral and poor communications, even a lack of commitment by the National TB Programme (NTP) and PPs, resulting in little improvement in TB control. This section discusses how professionalism, professional hierarchy and status affect the actor relationships and trust in the PPM-DOTS.

Professionalism

Studies have explicitly identified the professional differences among different actors. These actors often hold conflicting perceptions ranging from the attitudes towards each other, components of the TB programme, effectiveness and social implications of DOTS, thus causing conflicting mind-sets about social agendas and control practice, mistrust and unwillingness to collaborate (Vyas et al. 2003; Engel and van Lente 2014; Salve et al. 2016). For instance, Engel and van Lente (2014) suggested that the differences underlying problem definitions and control practices, including supervision, standardization and culture continued to clash among different actors in India. In terms of organizational culture, for example, the Revised National TB Programme (RNTCP) tended to 'control and command' as a bureaucratic and hierarchical organizational culture; the PPs tended to be 'control-averse' but in a professional monopoly, favoring individualism, discretion and autonomy rather than public health; the NGOs were community oriented and participatory. These conflicting values of professionalism and status and the associated control practices could contribute to different problem definitions and innovations, ultimately hindering the scaling up of PPM-DOTS (Engel and van Lente 2014).

In the face of the conflicting professionalism, TB programme staff and PPs tend to defend and protect their own profession and see their counterparts as threatening their professional interests. There is also a tendency to blame each other for not providing good care (Hurtig et al. 2002; Newell et al. 2005; De Costa et al. 2008; Engel and van Lente 2014). The private sector often lacked interest in public health aspects of TB treatment in the public sector. In Ujjain District, India, De Costa et al. (2008) found that the urban private providers were more reluctant to do record keeping and contact tracing, as they might perceive these activities as unrewarding and eroding practice time. Similarly, in Karachi, Pakistan, Naqvi et al. (2012) reported that, general practitioners found data management and follow-up of defaulted patients tedious, which did not help with their career growth. PPs also perceived the public sector to provide poor quality of care in India (Naqvi et al. 2012). PPs in Nepal also worried about the sustainability of the government PPP since government-run programs often failed before the introduction of DOTS

(Newell et al. 2005). On the other hand, Engel and van Lente (2014) suggested that the RNTCP often perceived the PPs as being untrustworthy, profit-orientated, and neglecting public health goals in India.

Professional hierarchy

Studies suggest that the interactions are often inherently unequal and ambivalent among the actors. This suggests the existence of professional hierarchies that may affect the collaborating actors' perception of their professional identity in the PPM-DOTS. Salve et al. (2016) found PPs had weak and unequal relationships with the government-dominated TB programme and felt it difficult to claim themselves as partners of the TB programme in a district of a Southern Indian State. PPs also felt neglected and undervalued in the actual process of implementation of the PPM-TB policy, despite their professional skills and knowledge of different medical systems (Salve et al. 2016). Kielmann et al. (2013) found that TB Health Visitors were in the awkward position of exercising control over PPs: on the one hand, PPs were the profession they would respect and obey otherwise; on the other hand, the non-medical status of the TB Health Visitors limited their interaction with the PPs, especially those allopathic doctors trained with an MBBS degree in western Maharashtra, India.

Professional status and control

PPs perceive entering a partnership as gaining professional status, for others, it may be loss of professional status. For instance, Kielmann et al. (2013) found that non-allopathic doctors, who perceived the benefits of linking with the RNTCP as improving their knowledge and legitimacy as clinicians, had better motivation to join the PPM-DOTS than allopathic doctors in western Maharashtra, India (Kielmann et al. 2013). Pradhan et al. (2011) suggested that PPs often perceived the RNTCP's policy on re-diagnosing patients referred by themselves after diagnosis as challenging their clinical skills, while perceived being a DOT provider as limiting their role as clinicians in Pimpri Chinchwad, Maharashtra, India. On the other hand, Engel and van Lente (2014) found that NCTB also

had the sense of losing control due to the transfer of responsibilities of direct supervision of patients and healthcare workers in administering DOTS to external partner in India.

Strategies for relationship and trust building

Due to the transferring of responsibilities, professional hierarchy, knowledge and status, diversity of practices and understandings, implementing the PPM entails effective communication, relationship and trust building. This requires openness, and often changes in the attitudes, of the collaborating partners through regular contact, active dialogue, diversity negotiating and reconciliation building (Vyas et al. 2003; Lönnroth et al. 2004; Newell et al. 2005; Pradhan et al. 2011; Engel and van Lente 2014). Based on their study in western Maharashtra, India, Kielmann et al. (2013) pointed out, building rapport between public and private sector required tedious discussion of hierarchy, knowledge and status, especially given the negative attitudes of PPs towards the public sector. Newell et al. (2005) found that working together and respecting the importance of all partners' ideas and fears resulted in a feeling of equality between all partners in Nepal. To address different interests of different actors in PPM in Ahmedabad, Gujarat, India, Vyas et al. (2003) suggested reconciliation building through obtaining and distribution of objectives, evidence-based information, and exposing physicians from both private and public health care sectors to each other's professional setting.

Many studies highlighted the important role of intermediaries and facilitators to ensure better implementation, trust building, monitoring, adherence and sustainability for the PPM-DOTS. These mediators can be international or local NGOs, universities or even individual health visitors (Hurtig et al. 2002; Lönnroth et al. 2004; Rangan et al. 2004; Naqvi et al. 2012; Kielmann et al. 2013). Rangan et al. (2004) found that the partnership between rural private medical practitioners and the RNTCP, through facilitation by an NGO, contributed to 30% of the cases detected in five months in the Pune district of Maharashtra State in Western India. Six months after withdrawal of the NGO, referrals from the private sector to the RNTCP decreased while the communication and documentation systems stopped (Rangan et al. 2004). In their analysis of processes and

outcomes of PPM-DOTS in the four countries, Lönnroth et al. (2004) also suggested that using a local NGO or a medical association as an intermediary may facilitate collaboration. However, the authors also pointed out that use of intermediary organisation would not ensure the success of the PPP without the subsequent resource support. For instance, the project funding in Pune was limited and consisted mainly of drugs supplied by a donor agency. Although PPM was facilitated by the research institution and implemented in collaboration with the NTP staff, the project was not well integrated in the public sector (Lönnroth et al. 2004)

3.4.2 Other health system components

The role of public sector leadership

Studies have stressed the key roles of the public sector in leading, coordinating and managing the processes of PPM-DOTS, and guiding and supporting the partners to build trust over time (Lönnroth et al. 2004; Rangan et al. 2004; Engel and van Lente 2014). However, this role may be neglected, as in most of the documented projects, an NGO or a professional body played a key role in establishing and mediating the collaboration between the public and private sectors. Lönnroth et al. (2004) argued that strong government stewardship functions e.g., policy and regulations, funding, monitoring and evaluation helped to manage PPs and align their practices to public health programmes. Based on the PPM-DOTS experiences from Nepal, Newell et al. (2005) suggested that good NTP leadership increased the confidence of the partners, thus helping to overcome the initial hurdle of partnership implementation. The NTP, with strong capacity to launch and oversee the PPP, should help to ensure care standards and a quick response to the emerging problems (Newell et al. 2005). However, a strong public sector leadership does not mean bureaucracy and top-down strategy without considering the interests of the PPs in planning and implementing PPM, which may contribute to failure of PPM (Lönnroth et al. 2004; Sinanovic and Kumaranayake 2010). As Salve et al. (2016) suggested, the dominance of the public sector TB programme could discourage the enthusiasm of the PPs for the PPM-DOTS.

Motivation and incentives

While most of the literature discusses the incentives and motivation for ‘participating’ in integration, this is less relevant for the thesis, which focuses on the delivery of integrated service in the designated hospital. There are very limited studies which discuss how to incentivise and motivate health providers to provide good quality of care in PPM-DOTS. For instance, Lönnroth et al. (2004) found that in Ho Chi Minh City, no free NTP drugs were provided, as provision of free TB drugs was regarded as a financial threat to exploit drug sales as a main source of the income of the PPs. In this city, direct financial incentives for case detection and treatment were used. However, these were not associated with improved diagnosis or treatment; nor were these regarded as important incentives by PPs (Lönnroth et al. 2004). Pradhan et al. (2011) argued that the programme’s approach that emphasised motivation, encouragement and leadership should be more important for ensuring good partnership, as compared to the financial incentives in Pimpri Chinchwad, Maharashtra, India. In Ujjain District, India, De Costa et al. (2008) found that most providers reported to collaborate for altruistic reasons of benefiting the society and individual patients, while urban qualified doctors saw collaboration as an opportunity to work with the government.

As this study aims to understand the provider’s prescribing behaviour in the designated hospitals in China, it is useful to understand the provider adherence to the DOTS guidelines in the PPM-DOTS. However, very few studies focus on the provider adherence to the TB guidelines. For instance, Pradhan et al. (2011) found that it was challenging to ensure partners’ ownership of DOTS and adherence by the DOT provider PPs to the RNTCP guidelines in sustaining quality PPM in Pimpri Chinchwad, Maharashtra, India. They found that 13% of the DOT provider PPs and 19% of the non-DOT provider PPs prescribed non-RNTCP regimens. Demand of patients, especially those with better education and socioeconomic status was the most reported reason for such prescription. Many DOT provider PPs failed to inform the programme regarding treatment interruption by patients within the specified time (Pradhan et al. 2011).

3.5 Hospital-based DOTS: the international experiences

The engagement of hospitals in PPM-DOTS strategy has increased rapidly. Large hospitals diagnosed and treated a large number of TB cases in many LMICs. A large survey identified a number of challenges of TB service provision in the non-DOTS hospitals in seven big cities of Asian and North African countries (Chiang et al. 2007). These included, for instance, poor reporting and referral of TB patients, the use of non-standardised treatment, poor patient tracing mechanisms and a lack of outcome monitoring (Chiang et al. 2007). In the early 2000s, the hospital-DOTS linkage project was initiated in the Yogyakarta province, Indonesia, where private and public hospitals detected nearly three times of the TB cases than those detected by the government health centres (Irawati et al. 2007). Therefore, integrating TB-DOTS in the hospital has great potential to improve the case detection, management and treatment outcomes.

Of the six selected studies, four studies were conducted in Indonesia. Most are intervention or program evaluation studies, which aim to understand the processes and outcome of the hospital-based DOTS implementation. The study design included intervention/program evaluation (Irawati et al. 2007), cross-sectional study (Chiang et al. 2007; Probandari et al. 2010), retrospective cohort study (Ifibunandu and Ukwaja 2012), mixed-method multiple-case study (Probandari et al. 2008), qualitative study (Probandari et al. 2011) (Appendix 3.3). Only one study included a conceptual framework, i.e., using Donabedian's model, to assess the quality of DOTS strategy implementation in hospitals covering structure, process and outcome (Probandari et al. 2008).

Relationships among the stakeholders in hospital-based DOTS

Unlike the broader PPM-DOTS, which mainly focuses on the public/TB programme and the private sector/practitioners, the hospital-based DOTS has additional emphasis on the internal coordination within the hospital. This is because within the hospital, TB control functions are split between different departments such as outpatient, DOT-unit, laboratory and radiological department. Probandari et al. (2008) suggested a lack of coordination in the case holding process within the hospital in Indonesia. In another study, Probandari et

al. (2010) observed the weakening of the internal DOTS linkages, with poor collaboration between outpatients and other units such as laboratory and radiology in the DOTS hospital in Indonesia. This problem could be attributed to a number of factors. At the micro system level, these factors included clinical leadership, teamwork and individual commitment of health professionals. However, the hospital and NTP policies also played a critical role in supporting and strengthening those factors (Probandari et al. 2010).

Professional conflicts exist between the public health and the hospital specialists/physicians in the DOTS hospitals. There is consistent resistance of the physicians towards the DOTS strategy and behaviour change in the hospitals. For instance, the physicians in Indonesia perceived that the diagnosis and treatment for TB patients in hospitals should not be standardised as in primary health care centres (Probandari et al. 2008). They also tended to continue to treat TB at the end of continuation period if they found 'TB pattern' still existing on the X-ray (Probandari et al. 2008), and 'over-diagnosed' sputum smear-negative cases (Irawati et al. 2007). Within the hospital, hospital directors and the trained general practitioners perceived themselves as having less bargaining power to persuade the hospital specialists in adhering to the DOTS strategy (Probandari et al. 2008). In addition, the NTP supervisors were not willing to supervise the performance of the hospital specialists in Indonesia, due to the perceivably higher professional status of the hospital specialists (Irawati et al. 2007). These problems again indicate the difference in cultures between public health staff and hospital specialists, with entrenched biases about population-based versus individual patient care (Irawati et al. 2007).

The studies emphasized the importance of appropriate networks and communication in achieving quality performance in their DOTS strategy (Irawati et al. 2007; Probandari et al. 2008). Some studies also emphasized the intermediary role of an organization in coordinating the relationship between the NTP and hospitals and PPs (Irawati et al. 2007; Probandari et al. 2011). In Indonesia, a stakeholder-based coordinating body at the provincial level, i.e. Provincial DOTS Committee served as an interface between the NTP

and the hospital sector, allowing problems to be openly discussed and effectively addressed (Irawati et al. 2007). This mechanism also helped the partners to reach compromises and acceptance of the partnership after the initial hurdles in collaboration in Yogyakarta (Probandari et al. 2011).

Governance and resources

In line of the insufficient incentives, regulation for the implementation of standards, clinical audit, internal and external supervision became more important in improving the quality of hospital-DOTS linkages such as recording and reporting practices in the hospitals (Irawati et al. 2007; Probandari et al. 2008). Irawati et al. (2007) also suggested that systematic monitoring and evaluation helped the stakeholders to understand ‘what works’ in the hospital-DOTS linkage model in Indonesia. Probandari et al. (2008) suggested that better resources allocated for training could explain the better performance of DOTS hospitals in one province than another in Indonesia. Based on the experience from Yogyakarta, Probandari et al. (2011) argued that good governance would help to establish effective and sustainable partnership. However, the interactions, motivation, and trust among the partners could fade out due to the scarce resources and weak governance (Probandari et al. 2011).

Provider adherence to the DOTS strategy

As this study aims to understand the prescribing behaviour of the TB doctors in the designated hospitals in China in line with the national guidelines, it is helpful to understand provider adherence to the TB guidelines in the context of hospital-DOTS more broadly. The reviewed studies generally suggested poor adherence to the DOTS strategy. For instance, Irawati et al. (2007) found that, compared to health centres and chest clinics, hospitals were weaker in case holding and supervision, and reported lower cure and success rates in Indonesia. Probandari et al. (2008) found that among the eight DOTS hospitals under study, overall adherence to diagnosis and treatment standards was low, in both public and private hospitals in Indonesia. For example, only one hospital performed at least two sputum tests on all suspected TB cases, and only two performed follow-up

sputum examination for all registered TB patients (Probandari et al. 2008). However, the large survey in the Asian and North African countries found that almost all the DOTS hospitals under study, except in Kathmandu, always conducted sputum smear tests for the suspected TB cases. In another study, Probandari et al. (2010) found that 19% to 53% of outpatient adult TB cases and 4-18% of sputum smear positive TB cases in the PPM-DOTS hospitals did not receive the standardised DOTS treatment in Indonesia. The authors discussed a number of reasons for the poor implementation of DOTS for TB patients. In terms of the treatment policy and regimen, there was perceived low quality of services due to provision of free TB drugs and perceived complexity of DOTS based diagnosis and treatment. Accordingly, physicians were reluctant to use DOTS regimen or to refer TB cases to the DOTS unit while there was lack of cooperation from the patients as well (Probandari et al. 2010). In a Nigerian tertiary hospital, Ifebunandu and Ukwaja (2012) found the drop-out rate of TB treatment was nearly 30%: 77% of these drop-outs occurred during their intensive phase of treatment, with the median default time up to seven weeks.

3.6 Hospital-based DOTS: the Chinese experiences

As described in Chapter 1, there are mainly two approaches of PPM-DOTS in China: the TB dispensary model and integrated model. Strictly speaking, the dispensary/CDC model should not be included for this review as in this model, general hospitals are only required to report and refer the TB suspects or cases to the TB dispensary, and so it is difficult to be justified as ‘integration’, based on my working definition. Therefore, this section will focus on the review of the health systems components and processes associated with the implementation of the integrated model in China, wherever relevant, compared to the TB dispensary model.

Most of the studies on hospital-DOTS in China included for review are those of the COMDIS-HSD¹³, China National Health Family Planning Commission (NHFP), and the

¹³ COMDIS-/HSD was the research programme where I used to work.

Gates Foundation TB Project ('China-Gates TB project' for short). Of the twelve selected studies (Appendix 3.4), most were policy evaluation studies, which aimed to understand the impact of integrating TB care into the designated hospitals. The study design included for example, a mixed-method, cross-sectional study (Hu et al. 2016, Jia et al. 2016, Chen et al. 2015) and a quantitative, cross-sectional study (Sun et al. 2013; Wei et al. 2013a; Wei et al. 2013b; Wei et al. 2014; Qiu et al. 2015). Only one qualitative study is available which aimed to understand the process of integration (Zou et al. 2012).

Provider adherence to the national guidelines

Again, as this study aims to understand the prescribing behaviour of the TB doctors in the designated hospitals, it is necessary to review the current situation of provider adherence to the national guidelines in terms of outpatient regimen and hospital admission.

Outpatient regimen

Different from the international hospital-DOTS studies, studies from China seem to be more specific and focus more on treatment plans. In general, the studies reflect the common problems of prescribing non-free, non-guideline recommended drugs and medical examinations for TB patients in China. A study conducted by Jia et al. (2016) found that the proportion of outpatient TB patients who paid for laboratory tests, liver protection drugs, and image examinations was about 100%, 80% and 70% respectively in Jiangsu province. They also found that nearly 40% of the patients who received only outpatient care took non-free, second-line anti-TB drugs (Jia et al. 2016). However, this rate in the designated hospitals was lower from the COMDIS studies by the author of this thesis and colleagues. For instance, Wei et al. (2014) found that only 19% of patients in the integrated sites used non-free second-line anti-TB drugs, as compared to 74% of the specialist sites¹⁴ and 42% in the dispensary sites, during the TB care-seeking. Sun et al. (2013) found that use of second-line anti-TB drugs in the designated hospitals was significantly lower than that in the TB dispensary (25% vs. 47%); however, this varied

¹⁴ Specialist model is a special form of the TB dispensary model. It means a prefectural level TB or chest hospital happens to be located in a county. In this case, TB cases may visit the TB specialist hospital, although the TB dispensary still remains the basic management unit for TB.

greatly across the three integrated hospitals under study (ranging from 8% to 64%) (Sun et al. 2013).

Literature has briefly discussed the limitation of the free treatment policy perceived by both public health and TB designated hospital staff (Jia et al. 2016). The policy was criticised for having excluded many necessary but expensive tests and drugs, such as liver function tests and liver protection drugs. However, some CDC TB officers suggested that prescribing non-free anti-TB drugs and CT (instead of X-ray) examinations was unnecessary and expensive. Many healthcare providers in the TB designated hospitals showed little trust on the effectiveness and quality of the free fix-dose-combination (FDC) regimen. They argued that given the difficulty of dealing with the side effects caused by individual components of the FDC, it was important to prescribe non-free anti-TB drugs (non-FDC first-line or second-line anti-TB drugs) to avoid the side effects of free TB drugs (Jia et al. 2016).

Hospital admission

Although the national TB care guidelines recommend outpatient care as a basis for TB treatment, admitting uncomplicated TB cases was common in China. Jia et al. (2016) found hospital admission rates for TB patients ranged between 39% and 83% in two counties of Jiangsu province. Hu et al. (2016) found that the TB patient admission rates in Zhenjiang, Jiangsu province, and Hanzhong, Shaanxi province, were up to 55% and 56 %, respectively. However, Wei et al. (2014) found this problem was less serious in Shanghai and Guangxi, with only 15% patients had unnecessary hospitalisation, as compared to 83% in the specialist sites and 38% in the dispensary sites.

The literature suggests that the high admission rate of TB patients is due to profit-driven provider behaviour in the hospital (often perceived by the CDC's public health workers), induced demand of health insurance, social discrimination, patient request, reducing community infection and avoidance of potential medical disputes in the context of poor doctor-patient relationship. For instance, the CDC public health staff often attributed the

prohibitive financial expenditure and a high level of deviation from national guidelines to the profit-seeking behaviour of public hospitals. Such motivation responded to the need to improve cost recovery and bonus payment, especially because admitting patients for hospitalisation could generate more income than outpatient services (Wei et al. 2014; Hu et al. 2016; Jia et al. 2016). However, hospital managers and staff considered hospital admission as an essential control measure to reduce and/or avoid community infection, especially for those with smear-positive pulmonary TB (Hu et al. 2016; Jia et al. 2016). Health insurance schemes should also induce more hospital admissions since they provided better reimbursement for inpatient services; and even no reimbursement for outpatient care (Hu et al. 2016; Jia et al. 2016). Hu et al. (2016) also showed that the admission rates were associated with different health insurance schemes. The reimbursement ceiling policy, which specifies the maximum cost for reimbursement, could also cause repeated admissions and discharges for serious patients, causing a higher financial burden on patients due to the need to pay a deductible for each admission (Hu et al. 2016). The patient request also contributed to high admission rate, since some TB patients concerned about the potential risks of infecting the family and community. Patients were also concerned that home visits by health workers could reveal their diseases to the neighbors, if not hospitalised (Hu et al. 2016). To avoid the potential disputes with patients, doctors would also admit TB patients upon request to meet their expectations (Hu et al. 2016; Jia et al. 2016).

Cost and financial burden

Most of the studies reported that under the current ‘free diagnosis and treatment’ policy, the financial burden remains heavy on TB patients with substantial costs of examinations, tests and auxiliary drugs and inappropriate hospitalisations in the designated hospitals. This will be analysed through comparison with other service delivery models, where relevant, in terms of the medical expenditure, catastrophic health expenditure (CHE) and delays of TB treatment in China.

Comparison with other models

The literature presents mixed results of out-of-pocket medical expenditure of the integrated model as compared to other models. Qiu et al. (2015) showed that, after excluding expenses covered by health insurance, the average total out-of-pocket payment (OOPP) in the integrated site (RMB14,304.4) was more than twice of that in the dispensary site (RMB 5,639.2) (Qiu et al. 2015). The OOPP here referred to the cost after excluding reimbursement through medical insurance from the total costs. The total costs covered direct costs, i.e. medical costs related to TB diagnosis and treatment, transportation, accommodation and food; and indirect costs, i.e. a loss of income of the patients and their caregivers due to an inability to work due to TB. However, the authors did not specify clearly whether their cost estimation covered the pre-designated hospital/TB dispensary treatment expenditure, although their discussion seemed to indicate so.

Studies from the COMDIS-HSD estimated the direct medical expenditure that TB patients spent from the first contact of health care to completion of TB treatment in the TB designated hospitals/TB dispensaries(CDCs). They only included TB patients without serious comorbidities to reduce the case-mix problem for comparison. These studies reported lower out-of-pocket medical expenditure occurring in the integrated model as compared to other models. Wei et al. (2013a) showed that TB patients in the integrated model presented the least average out-of-pocket medical expenditure (RMB2,080)¹⁵, as compared to the specialist (RMB10,190) and dispensary sites (RMB2,380)(Wei et al. 2013a; Wei et al. 2014). Similarly, Sun et al. (2013) reported that the medical expenditure in the integrated model was RMB 2,721, significantly lower than that in the dispensary model (RMB 5,966) in Zhejiang. This cost was similar to that in a later study by Wei et al. (2013b) in the same province, which reported that the TB patients spent a median out-of-pocket medical costs of RMB 2,388 in total, including RMB 1,506 spent in the TB clinics of the TB designated hospitals in Zhejiang. However, results on medical

¹⁵ The national average Per Capita Disposable Income was RMB18,311 in 2013.1USD=6.3 RMB approximately.

expenditures occurring in the designated hospitals from different studies were mixed as compared to dispensaries or specialist hospitals. For instance, Wei et al. (2014) found that medical expenditure in the designated hospital (RMB1,200) was similar to that in the dispensary (RMB 1,160) although lower than that in the specialist hospital (RMB 2,200) (Wei et al. 2014). Sun et al. (2013) found that the medical expenditure in the three designated hospitals was either higher or lower than that in the TB dispensary in Zhejiang.

Studies from the China-Gates studies do not compare the integrated models with other models, but just report the cost of accessing TB care and treatment. Jia et al. (2016) reported that laboratory tests, liver protection drugs, and image examinations (e.g. CT) of the outpatient TB patients constituted the majority (75%) of the outpatient expenditure. On average, patients who received only outpatient care spent RMB 1,135 upon completion of TB treatment. However, the cost was ten times higher for the patients who received both outpatient and inpatient care (up to RMB 11,117) (Jia et al. 2016). Hu et al. (2016) found that the average inpatient cost in six counties of Jiangsu and Shanxi provinces ranged from RMB 3678 to 7215, with the average length of stay ranging from 12 to 22 days. The average medical costs for TB inpatients in two counties (RMB 7,215 and 4,644) even exceeded the NCMS reimbursable limits in the two counties (RMB 5,500 yuan and 3,800) respectively (Hu et al. 2016).

Catastrophic health expenditure (CHE)

Studies often used the CHE to measure the financial burden of TB treatment. They either used household income measurement, i.e., total OOPP as a percent of the annual household income exceeding 10%; or household capacity to payment measurement, i.e., percent of OOPP exceeding 40% of the annual household non-food expenditure. Two studies have compared the CHE in the integrated model with other models. Qiu et al. (2015) suggested that, after excluding expenses covered by health insurance, the total OOPP in the integrated site accounted for 20.5% of the annual family income, two times that in the dispensary site. This burden is similar to that in a China-Gates study, where the

OOPP accounted for 23% of the average annual household income (Zhou et al. 2016)¹⁶. Using the household income measurement, Zhou et al. (2016) found that 70% of the TB patients suffered from the CHE, while Chen et al. (2015) found more than half of the TB patients in the China-Gates study¹⁷.

In the COMDIS-/HSD study, Wei et al. (2014) found that the OOPP accounted for 15% of the mean capacity to payment as compared to 73% in the specialist sites. However, this ratio in the integrated sites was much lower than that in the China-Gates study (49%), using the same measurement (Zhou et al. 2016). Using the same measurement, Wei et al. (2014) found that 37% of the patients in the integrated sites incurred CHE during the care-seeking process, as compared to 52% in the dispensary sites and 83% in specialist sites. Again, this ratio in the integrated sites is much lower than that in the China-Gates study (55%) (Zhou et al. 2016). In the China-Gates study, the regression analysis showed that hospitalisation and health insurance status remained the most important determinants for the CHE (Zhou et al. 2016). Li et al. (2016) further showed that non-medical costs¹⁸ relating to TB treatment also constituted a serious financial burden, with 20% and 37% of the TB patients reporting CHE on non-medical costs, based on the capacity to payment and household income measurements respectively. In two of the above cities, Xiang et al. (2016) found that the NCMS only had modest impact on reducing the CHI of TB patients, with insignificant reduction of the CHE incidence (among the TB patients) and only slight alleviation of the severity of CHE (measured by the OOPP as a proportion of the annual family income among the patients with CHE) in both cities after reimbursement. In this paper, the authors used household income measure to define catastrophic payment, and the cost only referred to the TB treatment cost after TB diagnosis (Xiang et al. 2016).

Both qualitative and quantitative analysis suggests a number of factors contribute to the higher cost and financial burden of TB treatment. Outpatient TB care services were not

¹⁶ OOPP included direct medical and non-medical cost, but not the indirect cost such as income loss.

¹⁷ OOPP as the sum of direct medical and direct non-medical cost and indirect cost (e.g., income loss).

¹⁸ Non-medical costs covered transport, accommodation, and nutritional supplementation, before, during and after TB diagnosis (including hospitalisation).

commonly covered by health insurance schemes such as lab tests, CT scans, and liver protection drugs. Even for the inpatient services, many prescribed services and drugs were actually excluded from the benefit packages, resulting in poor reimbursement (Jia et al. 2016). Higher inpatient costs could also be due to the treatment of patients with comorbidities, which required more expensive, and often a self-paid drug regimen (Hu et al. 2016). However, other factors such as diagnosis delay, hospitalisation, and use of liver protective drugs and the second-line anti-TB drugs could also lead to the higher total OOPP (Qiu et al. 2015). Financial factors such as household incomes, perceived economic burden relating to TB treatment, and high costs for transportation, lodging, and food have contributed to the low compliance of TB treatment (Chen et al. 2015).

Delays

Health system delay is often used to measure the health systems performance of the TB control. Studies on delays are mainly identified from COMDIS studies. It was reported that the integrated model presented shorter patient treatment pathways, and fewer patient costs and shorter delays as compared to other models (Wei et al. 2013a; Wei et al. 2014). In the integrated model, most of TB patients (68%) were diagnosed in designated hospitals. Patients in this model presented the simplest TB care-seeking pathways, with the least number of providers visited (2.2), and shortest treatment delays (2 days, from diagnosis of TB to initiation of DOTS treatment in the designated hospital), as compared to the dispensary model (12 days) and specialist model (18 days) (Wei et al. 2013a; Wei et al. 2014). Logistic regression confirmed hospitalisation as a key determinant for longer treatment delays and higher medical expenditure (Wei et al. 2013a; Wei et al. 2014). Similarly, Sun et al. (2013) found that the integrated model had a shorter health system delay (5 days, from the first contact of health service to the standard TB diagnosis) than the dispensary model (32 days) in Zhejiang. In Zhejiang, on average, a patient from the integrated model visited two health providers (median), with the minimum external provider delay (median=1, from the first contact of health service to the contact of the designated hospital) and internal provider delay (median=0, from the first contact of the designated hospital to contact of TB clinic), respectively. Logistic regression analyses

suggested that visiting the primary care facilities first was associated with longer external delays (Wei et al. 2013b).

Other health systems processes or contextual factors

Most of the literatures focus on the understanding of health systems implications of the integrated model from patients' perspective (mainly quantitatively), with limited qualitative insights on the perspective of the health providers. Few studies have been published which provide an in-depth understanding of the broader health systems context and processes of service integration. Only one paper led by the author of this thesis has provided an in-depth understanding of the motivation and processes of integration of TB services in general hospitals in China (Zou et al. 2012). The study identified the differences in the integration processes between the more prosperous site in East China and the poorer site in the West in terms of hospital-CDC coordination, resource allocation, and patient-centred care. For instance, the richer integrated site presented a more coordinated but informal approach of management (versus a more authoritative and top-down approach); direct government funding for the designated hospital (versus reallocation of funding to the hospital through the CDC); and a more patient-centred service (versus a more profit-orientated), as compared with the poorer site (Zou et al. 2012). However, this study only looks at the broader management processes of integration without addressing the prescribing behaviour of the hospital providers in the context of service integration.

Given the inconsistent definitions of the key variables such as OOPP and CHE, and lack of clarity about the patient selection process and cost dimensions (e.g. focusing on only after TB diagnosis or covering the full pathways of care seeking) among different studies, synthesis of and comparison with literature is difficult. Despite these limitations, the studies commonly suggest the negative health system implications of integrated service delivery on such as high cost and burden from TB treatment. The qualitative analysis is limited, which is often used to support the main quantitative evidence to suggest the failure

of the ‘free’ TB care policy under the integrated model, or the limited impact of health insurances on reducing the financial burden.

3.7 Discussion

Summary of literature

Despite the vast body of PPM-DOTS studies for TB control in the LMICs, few studies have synthesized such evidence from the broader health systems perspective. For instance, Lei et al. (2015) evaluated the performance of PPM programs against six widely used themes associated with different collaborative mechanisms (support, contracting, multi-partner group): DOTS utilization, case detection, treatment outcomes, case management, accessibility/equity and costs. However, the authors failed to review and assess the broader health systems components such as governance, resources and culture during the implementation of PPM-DOTS. Drawing from the broad PPM-DOTS and hospital-DOTS literature, this chapter identifies the key health systems software and hardware of delivering the integrated service in TB control. Most of the international literature discusses the service delivery in the public-private mix context. Integration with PPs seems to have received greater research attention than the hospitals, either public or private. It is unclear whether this is because hospitals are less engaged with actual PPM-DOTS implementation, hospital-DOTS implementation is assumed to be performing well, or the private sector itself is receiving more attention from the funding agencies.

This review suggests that the broad PPM-DOTS studies tend to have stronger qualitative-based components than the hospital-based DOTS studies. Compared with the broader PPM-DOTS studies, the hospital-based DOTS studies tend to have weaker analysis of the health systems software, such as power relationships between different actors and other human factors (e.g. motivation) and health systems hardware (e.g. governance and leadership) in understanding the integration.

Studies on the integrated models in China have largely emerged in the recent ten years. However, most of these studies are quantitative and descriptive, focusing on the health

systems implications of integrated service delivery on the provider adherence to the national guidelines and the associated cost, delay and financial burden in the designated hospitals. There is very little analysis of other health systems components of integration, such as power relationships and human factors (e.g. motivation), governance and leadership, as compared to the international PPM-DOTS and hospital-DOTS studies. In other words, there is a lack of systematic and in-depth exploration of the provider behaviour in the context of integrated service delivery in China. This is not surprising in China, where health systems research, especially in the area of TB control, is mainly dominated by a positivist and quantitative approach.

Chinese studies have commonly suggested the poor provider adherence to the national guidelines and focused on the assessment on the prescribing of non-free, non-standardised drugs and high-end medical examinations. The PPM-DOTS and hospital-DOTS studies in other LMICs also suggest the poor providers' adherence to the diagnosis and treatment standards. However, such assessment tends to focus on the adherence to the diagnostic procedures such as sputum test, X-ray examination and treatment dropouts. Prescribing of non-free, non-guideline recommended high-end diagnostics and drugs may be more typical of the Chinese health systems. However, limited studies in other LMICs have mentioned about the prolonged treatment for TB, and potential influence of patients' demand on the prescribing behavior. This suggests the over treatment behavior may also exist among the general health providers especially those working in the private sector. However, more studies may be needed to better understand the clinical prescribing behavior of the general health providers in the other context of integrated service delivery.

CAS Characteristics of integration

Few studies have explicitly adopted a complex dynamic or adaptive systems theory to explain the integration of TB services with the general health services. This has limited the exploration of the comprehensive and dynamic picture of TB service integration. However, the studies under review have collectively demonstrated the features of complex adaptive systems. For instance, integration not only produces intended consequences, but

also unintended, negative consequences. Integration is assumed to improve efficiency, increase quality of health services, and increase satisfaction and sustainability of services and improve health in the long term (WHO 1996). It is believed that the holistic and multisector approach is more likely to be successful than vertical approach/disease control programme approach in controlling the communicable disease epidemic that is influenced by the complex factors. While integration has indeed improved the management and outcomes of TB, it also brings unintended outcomes, for example, overtreatment, and increasing cost of service provision (Atun et al. 2008).

Many studies present the dynamic power relationships between the TB programme, PPs, hospitals and other providers in the integrated service delivery. This review suggests that integration and interactions between TB programmes and general health services tend to resemble a difficult marriage. Many of the professional conflicts as revealed from this review, such as the debate of public health vs. individual health, are rooted in the underlying values and principles of the professionals within these two sectors (Criel et al. 2004). In addition, as this review suggests, integration is often hindered by the lack of dialogue and respect, and consequently, growing tensions between disease control programme and general health care staff. Integration thus requires a more open relationship and more exchange, to benefit the health of patients and populations (Criel et al. 2004).

Studies also discuss the role of the hardware of health systems such as leadership and governance issues in the integration. Atun et al. (2008) argue that technical, financial, resources and service factors related to the health system may also influence the process and outcome of integration. As this review suggests, lack of effective governance and resources can also affect the relationship and collaboration between the participating partners.

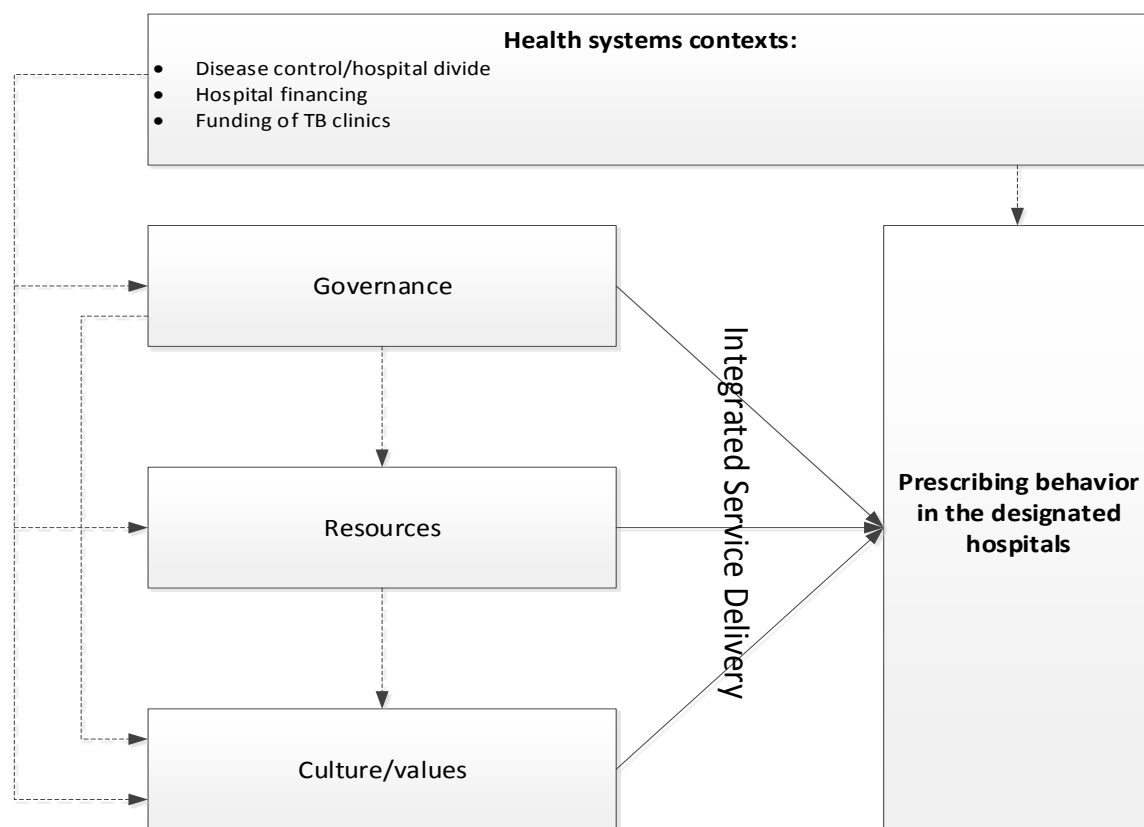
Gaps in knowledge on hospital-based TB care in China

Most of the studies, especially the hospital-DOTS studies in China, fail to consider multiple, dynamic influences on the processes of service integration. In China, financial incentives are commonly used to explain the failure of the free TB care delivery in the designated hospitals where government funding is lacking. However, a number of questions remain unknown related to the integrated service delivery in the designated hospital. For instance, how is the integrated service managed in this new model of care? What are the major resource issues related to the integrated service delivery? Whether and how does the medical culture influence the integrated service delivery? How are these issues co-related to each other and the broader health systems context? Whether and how these issues as a whole would influence the prescribing practices of the TB doctors in the hospital? It is therefore important to conduct a more comprehensive and dynamic analysis of these factors in the context of integrated service delivery in the designated hospitals.

3.8 Conceptual framework

The conceptual development was an evolving and iterative process. Bearing the above questions in mind, an initial framework was conceptualized at the outset of the project to show health systems influences on the prescribing behaviour of TB doctors working in the designated hospitals (Figure 3.1).

Figure 3.1 Conceptual framework to evaluate the integrated TB service delivery in the designated hospital in China



The framework included the following health systems components and processes:

- The health systems context, including the highly divided disease control and hospital systems and the different professions, government funding to the general hospitals, and funding of the TB clinics;
- Health systems components and processes potentially relevant to this study, including governance, resource generation, and organisational culture for integrated service delivery, explained as follows:
 - Governance refers to the management of integrated services in the designated hospitals. Areas of inquiry may include the setup of the PPM-DOTS committees, leadership, supervision, guidelines, and regulations related to the integrated service delivery.

- Resources refer to human resources and physical resources, drug supply and information management required for the integrated service delivery in the designated hospitals.
- Organisational culture refers to the collective values, beliefs and principles of an organisation, and here mainly reflects the medical culture in the hospital, and professional culture and values embedded in TB practices between different health professionals.
- The outcome of interest in this study is provider prescribing behaviour of the TB doctors in the designated hospitals.

This framework was used to guide the data collection and analysis. Principles of systems-based (CAS) thinking, informed the framework, namely that the health systems(in this case, integrated service delivery system) is composed of a set of interconnected components of both systems ‘hardware’ (building blocks) and ‘software’ (e.g. organizational culture) as well as actors, with dynamic interactions and processes simultaneously affecting and shaping the systems responses. Specifically, it is assumed that in the context of integrated service delivery, prescribing behaviour of the TB doctors in the designated hospitals is shaped by the broader health systems context(e.g., government funding for the hospital), and influenced by the governance, resources, culture, which are embedded within the broader health systems context. Governance should have an influence on resource management and culture/values,; and medical culture should also be shaped by the availability of resources (for example, better training on public health for TB doctors may mediate their medical values in providing TB care in the designated hospital).

While this initial conceptual framework contained interacting elements, I found it to be somewhat simplistic and two-dimensional as I progressed with data collection. It was difficult to identify the CAS relationships (like emergent behaviour, feedback loops, actor tensions) during the initial stages of study. For instance, the arrows implied that prescribing behaviour was a linear outcome of governance, resources and cultures/values.

While recognising the ‘simplification’ of processes in this initial framework, it was adequate as a starting point, and allowed me to explore and elaborate on the CAS characteristics of the system during the data analysis.

Emerging findings from the data analysis helped to conceptualise CAS features such as simple rules, networks and tensions of adaptive agents, feedback, self-organisation, and emergence (Plsek and Greenhalgh 2001). Over the course of the data analysis, the original framework was fleshed out to show dynamic complexity in the health systems components and processes. In Chapter 4 (Methodology), I discuss the on-going data analysis process that led me to develop the overall CLD, which was iteratively refined for the further discussion (in Chapter 9).

Chapter 4 Methodology

The purpose of this chapter is to outline and explain the research methodology employed in this study. In the next section of the chapter, I will clarify my philosophical position with regards to its influences on my study methodology. Subsequently, I will discuss the study design adopted, and provide justification for the choice of study. This is followed by the discussion of the methods employed for the study and the research procedures. Then I will discuss the ethical issues and provide self-reflexivity before concluding the chapter.

4.1 Philosophical position

Clarifying my philosophical stances- ontology (view of reality) and epistemology (theory of knowledge) will provide insight and justification for the choices of theoretical foundation, study design and methodology adopted in the present study. To address the research aim of understanding the prescribing behaviour in the context of integrated service delivery, I favour ‘critical realism’, which sits between positivism and interpretivism.

Positivism has its root in the foundationalism (or objectivism, realism) which postulates that the world exists independently of social actors (including researchers). Based on this, the positivists maintain that objectivity is achievable and they try to identify statistically driven, generalisable laws, relationships, patterns and regularities of the phenomena being investigated. They believe that cause and effect that operate in reality remain true in different contexts. Subjects are chosen using the sampling techniques to eliminate potential sources of bias and generalisations are made from the sample to a wider population (McEvoy and Richards 2006; Gilson 2012b).

Interpretivism is rooted in the ontological position of anti-foundations (or subjectivism, constructivism), which predicates that the real world is socially ‘constructed by human actors and does not occur independently of our knowledge’. Interpretivists do not believe

‘objective’ or ‘value-free’ observations, since the real world is constructed through the interactions of various actors, whose interpretations are further constructed by the observer. This ‘double hermeneutic’ results in limited objectivity. Interpretivists aim to explore the intentions, beliefs, values, reasons and how to make meaning of the social actors, while acknowledging the researcher’s construction of knowledge through their own interpretation of hearings and observations. Given this, qualitative research methods create a more precise understanding of social behaviour (McEvoy and Richards 2006; Gilson 2012b).

Critical realism shares similarity with the positivism that social reality exists independently of social actors; but it also accepts that actors’ interpretations of that reality have influence over the nature of social change. As a philosophy of science, critical realism is founded upon a priori or necessary truths about the nature of the world. Positivism argues that reality is apprehendable and knowledge can easily be captured and generalized in a context-free form. However, critical realists argue that fully apprehending the reality is impossible, due to our perceptions that are being shaped by our theoretical resources and investigative interests. In particular, critical realists argue that the real world operates as a multi-dimensional open system where effects arise due to the interaction between social structures, mechanism and human agency rather than following a set order. However, positivists treat the social systems independent of external influences in a closed system, failing to include the analysis of the interactions between mechanisms and the contexts in which they occur. Critical realists appreciate the value of interpretivism, which focuses upon discourse, human perception, and motivation, as human reasons can serve as causal explanation. However, interpretivists fail to relate discourses to the social networks in which social actors are embedded to the underlying social structures, which may enable or hinder the actions of individuals (McEvoy and Richards 2006; Gilson 2012b). Like positivists, critical realists seek to identify the casual mechanism underpinning social phenomena, such as health policies and systems. However, they do not accept that cause and effect mechanism hold across context and times, since actors

and context play a role in shaping the cause and effect relationships. Like the interpretivist, they also adopt an interpretive understanding (McEvoy and Richards 2006; Gilson 2012b).

Therefore, the primary task of critical realists is not to identify statistically generalisable laws (positivism) or to identify the lived experience or beliefs of social actors (interpretivism). They aim to develop deeper levels of explanation and understanding, or generate theories that explain the social world and, to identify the mechanisms that explain the outcomes of interventions (McEvoy and Richards 2006; Gilson 2012b). In this study, while I seek to explore the casual mechanism underpinning the prescribing behaviour, I do not control the context and any variables, and hold them as constant as the positivists will do. For instance, I would not run regression analyses to identify a number of statistically generalisable relations between the independent and dependent variables (the prescribing behaviour), as I do not believe such relationships will remain consistent in various contexts. Instead, I believe health systems components and processes, actors and contexts and their interactions would play a role in shaping the prescribing behaviour in the context of integrated service delivery. On the other hand, although I adopt the interpretive understanding of the prescribing behaviour as the interpretivists will do, my aim is not really to identify the lived experience or beliefs of social actors; instead, to provide a deeper level of explanation and understanding of the prescribing behaviour in the context of integrated service delivery. Adopting a critical realist perspective is compatible with my choice of the mixed-method, explanatory case study that is based on CAS thinking. With the help of the systems-based framework as concluded in the last chapter, this study will explore how health systems components and processes interact with the health systems and reform contexts to shape the prescribing behaviour in the context of integrated service delivery.

4.2 Study design

4.2.1 Case study and justification of the choice

According to Yin (2003), three conditions should be considered for choosing a research strategy: the type of research questions, the control an investigator has over actual

behavioural events and the focus on contemporary versus historical phenomena (Yin 2003). This study employs a mixed-method, two-stage case study approach, which is considered the most appropriate research design in view of the research objectives. As explained in Chapter 1, this study aims to understand the prescribing behaviour in the context of integrated TB service delivery in the designated hospitals. Specifically, this study will examine: 1) To what extent the non-free, non-standardised drugs and medical tests and hospital admissions are prescribed for the uncomplicated TB patients in the designated hospitals? 2) What are the influences of the health systems components and processes on prescribing behaviour in the context of the integrated service delivery? The research questions can be addressed through several designs. Surveys can answer 'how many' or 'how much' questions, but in addition to these questions, this study needs to address 'how' and 'why' questions (Yin 2003; Keen and Packwood 2006). An experimental or quasi-experimental design can address 'how' or 'why' questions, apart from the effectiveness question (Yin 2003; Keen and Packwood 2006); however, in this case, this is neither relevant or feasible since the author has no control over events. The case study approach is suitable for the overarching design of this study.

According to Yin, a case study is, 'an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin 2003, p.13). The case study is most often conducted within the context of its use. This contrasts with an experiment, which deliberately isolates a phenomenon from its context, focusing on a limited number of variables (Zainal 2007). The detailed accounts, especially the qualitative accounts, not only help to explore or describe the data in a real-life environment, but also help to explain the complexities of real-life situations, which may not be captured through experimental or survey research (Zainal 2007). Woodside (2010) contends the principal objective of case study is 'deep understanding', which enables the learning of the linkages and causal paths among concept variables. Case study allows for the holistic explanation of the social behaviour and phenomena, which are determined by a complex set of causes (Swanborn 2010). In case studies, it is not adequate to conduct simple cause models such as those

used in most survey analysis. Explanation is based on the pattern of the existing situation, rather than recourse to general laws and initial conditions from which an occurrence or condition is induced (Swanborn 2010). For instance, while a systems-based thinking(CAS) is adopted to explain the prescribing behaviour, the explanation is based on the specific conditions generated by the integrated service delivery model in the two sites.

In health care, case studies are useful to provide in-depth insight into health and healthcare interventions, to understand why a programme succeeds or fails, or to identify mechanisms underlying intervention effects (or absence of such effects) (Wensing and Grol 2005). Systems-based thinking (CAS) is compatible with the case study approach, and is one of those essential approaches to achieve in-depth understanding of a phenomenon and its context (Woodside 2010). Overall, case study method provides an in-depth and holistic analysis of phenomena and provides a well-rounded picture, especially with multiple sources of evidence, which the method employs.

Yin (2003) disagrees with the traditional scientists who hold that case study is more suitable for exploratory study, survey for descriptive phase, and experiment for explanatory phase. He suggests case studies can have three purposes: exploratory, descriptive, or explanatory. Exploratory case studies aim to understand distinct phenomena prior to the definition of the research questions and hypotheses. Descriptive case studies aim to completely describe different characteristics of a phenomenon in its context. Explanatory case studies aim to investigate causal relationships, and are characterised by how and why research questions. Explanatory case studies will help to address the inconsistencies between a preliminary theory and the evidence, leading to theory modification and enhancement. Therefore, the first two types of case studies are mainly used for hypothesis and theory building, while the last one is mainly used for theory testing. Given the research questions, this study is pitched as an explanatory case study since the study aims to provide explanation for the common phenomenon of the non-free, non-standardised prescribing for TB cases in China. A systems-based framework has been developed based on the literature review to guide the study, and will

be modified based on the study. However, it is worth mentioning that even in this explanatory study, there are a mixture of the descriptive and explanatory components. This study starts with the descriptive analysis of the non-free, non-standardised prescribing of TB treatment, before an explanatory account is provided based on the systems-based framework.

Based on the original research objectives, this study adopts a two-case design: with the TB clinic in one designated hospital receiving the government financial support, and another not. Yin (2003, p.47) describes how multiple case studies can be used to either, ‘(a) predict similar results (a literal replication) or (b) predict contrasting results but for predictable reasons (a theoretical replication)’. However, this study is not trying to compare outcomes (prescription behaviour) and attribute the outcome difference to the difference in funding arrangements by holding other factors in the context as constant as possible. Although the study results are written up in a comparative style, no hypothesis is proposed linking the two cases. Rather, the main purpose of conducting two case studies is to provide an enriched understanding of the health system components and processes (governance, resources and software/organisational culture), by which outcomes (prescribing behaviour) are determined under varied conditions (health systems contexts). Especially following the refinement of the research question, funding arrangements of the TB clinics are no longer the main interest of the study and have become part of the health systems context that may influence the health systems processes of integrated TB care delivery. Therefore, the case study approach in this study differs from Yin’s comparative approach, by adopting a critical realist perspective to explain a health systems phenomenon based on a system-based (CAS) thinking.

The case study approach is criticised for low generalisability, due to the limited number of cases under inquiry. However, case study uses different approaches of generalization, for example, analytic or theoretical generalization. Rather than generating findings of the sampled population to the defined population (‘statistical generation’), the case study compares its findings with an existing theory. This way case study contributes to the

‘generation’ of the theory, while more case studies can strengthen or broaden such generalisations (Yin 2003; de Saint-Georges 2018). Using the two hospitals as examples, this study illustrates a CAS-based framework that will help to explain the prescribing behaviour of the TB doctors in the context of integrated service delivery in the designated hospitals. This framework will be iteratively updated and refined based on the study results, with the potential to be adapted for use in other similar context of integrated service delivery.

The case study approach provides strong internal validity, since it seeks to identify intervention mechanisms and contextual factors that produce effect. However, this argument is vulnerable when the case study approach is compared to the highly controlled experimental design. Internal validity can be improved using techniques such as display of illustrations and diagrams, and cross-checking of the results to ensure internal coherence (Andreas 2003; Yin 2003). Adopting CAS thinking helps to achieve internal validity as it encourages holistic thinking, which brings together the health systems context, health systems components and processes, to explain the prescribing behaviour of TB doctors in the designated hospitals.

In a case study, construct validity is vulnerable to attack, as researchers may have more field visits and have closer interactions with the subjects than with those in general qualitative studies, such that the results may be more vulnerable to the researcher’s influence. This entails the establishment of a chain of evidence for sufficient reference, and use of triangulation, which uses multiple sources and multiple methods of evidence (Andreas 2003; Yin 2003).

4.3 Case selection

In this study, a ‘designated hospital’ is defined as a ‘case’. As explained in the Chapter 1, I have purposefully selected two designated hospitals- one with a ‘government-subsidized’ TB clinic (in Yongjia County), and the other without any government subsidy (in Cangnan

County), following a simple survey of the designated hospitals in the province (See Box 4.1 and 4.2 site selection criteria and processes).

Box 4.1 Selection criteria for study sites

Inclusion criteria

- The County should have implemented the integrated model for TB service delivery.
- During the site selection stage, funding arrangement was the main consideration. That is, to select two designated hospitals from two counties respectively, including one with major government funding for human resources and other operational costs in the TB clinic, and another almost without government support.
- Both counties having similar social-economic and demographic levels, e.g., population, per capita GDP, TB prevalence, and size of ‘designated hospitals’;
- Both having implemented the designated approach for at least 1-2 years at the time of the study to allow sufficient experiences of implementation to be studied;
- Both willing to participate, having good collaboration with the provincial CDC.

Exclusion criteria:

- Set up too recently, not allowing for sufficient experiences to be explored;
- Located in too remote areas, with inconvenient transportation.

Box 4.2 Process of selecting study sites

- At the time of study, there was no existing information available regarding the funding model for the TB service delivered in the designated hospitals.
- A simple survey was conducted with all the designated hospitals of the counties (n=80) in Zhejiang province in April 2013. The questionnaire covered information such as type of funding model, setup time of designated hospital, and other basic hospital information, as well as the basic socio-economic information of the counties.
- The provincial TB programme helped to distribute all questionnaires to the county CDCs, which collected the information as required.
- Data were input into a case selection table for systematic case selection.
- The designated hospitals which received government funding (beyond the funding for free TB treatment) for the TB clinics were identified. It was found that about 20% of the designated hospitals received government support.
- Three designated hospitals with better government support, and three hospitals with similar characteristics but without government support, were identified as potential cases.
- Field visits were conducted to these hospitals, with an aim to gain a broad understanding of the context of policy implementation and their willingness to participate in the case study.
- Finally, one designated hospital with better government support for the TB clinic (Yongjia), and another almost without government support (Cangnan) were selected for study. Yongjia and Cangnan designated hospitals were selected as these two hospitals fit well with the selection criteria. For instance, one designated hospital also received earmarked funding for the TB clinic, but the CDC officials were not as open as those in Yongjia for collaboration.

However, given the non-specific use of the ‘earmarked’ TB funding in Yongjia, I refined my research objective as understanding of the observed prescribing behaviour in the context of integrated service delivery within the designated hospitals. Although the study sites were selected before the research question was changed, this did not cause any research bias as the new questions allowed for more open exploration of the prescribing behaviour of the TB doctors. As explained in Chapter 1, both counties share similarity in the economic and health system development but differ in population size. Both hospitals have similar scale of TB clinics in terms of number of TB staff and TB notification. The two hospitals differ in funding arrangements for the TB clinics, and in terms of setup time of the TB clinics, affiliation of the TB clinics, historical support from the GFATM, and scale of the hospitals. All these differences may have potential influence on the prescribing behaviour of the TB doctors in the TB clinics in the designated hospitals. These differences also provide justification why funding arrangement for the TB clinics should not remain as the main assumption of the study, in addition to the fact that ‘funding for TB’ in one hospital is not specifically used for the TB clinic (Table 4.1).

Table 4.1 General information of the study sites (2012)

County	County¹⁹	Yongjia	Cangnan
socio-economic information	Average GDP per capita (RMB)	27,125	24,883
	Average urban resident income (RMB)	27,731	28,897
	Average rural residents income (RMB)	11,549	11,568
	Population	962,700	1,299,900

¹⁹ County socio-economic information was collected from the local government communiques on economic and social development in 2012(1USD=6.3 RMB approximately). Data of other indicators were collected from the provincial survey on basic information of the TB designated hospitals.

	Geography	Mountain	Mountain, costal
County health system information	% of total government spending on health	8.5	8.5
	Average government health spending per capita(RMB)	306	250
	Number of health facilities	520, including 10 hospitals	695, including 15 hospitals
	Number of doctors per 10,000 population	20	19.7
Hospital information	Hospital staff	478	983
	Hospital beds	300	600
	Hospital rating	2A(Secondary level A)	3B(Tertiary level B)
TB unit information	TB unit setup time	2009	2011
	TB unit staff	7 (2doctors,2nurses,1 pharmacists,1 laboratory staff,1other)	7 (2doctors,2nurses,1 pharmarcist,1 laboratory staff,1other)
	TB unit affiliation	Public health department	Infectious disease control department
	Number of TB cases	763	700
	Received GFATM support before this study	Yes	No

Following the site selection, I further visited the two counties, to meet with the key stakeholders such as leaders of the CDCs and designated hospitals and key TB clinics staff and brief on my study plan. This visit was also combined with an informal background interview to understand the public hospital reform, history of TB control, service integration and funding mechanisms in the designated hospitals (Appendix 4.1). This visit provided me a better understanding of the study sites before I conducted the main study (Section 4.5). Data collected from this background interview was integrated with the data collected from the main study for analysis (Section 4.5.2).

4.4 Research methods

Quantitative research has its philosophical standing rooted in a positivist paradigm, usually linked to the notion of science as objective truth or fact. Quantitative research is defined as ‘the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect.’ (Babbie 2007, p405) It starts with pre-specified objectives or hypothesis, focusing on the test of preconceived outcomes and demonstrate causal relationships under standardised (controlled) conditions. Using numerical estimation and statistical inference, quantitative research generalises its findings from the samples to population. Examples of quantitative methods include survey methods, experiments, mathematical modelling (Casebeer and Verhoef 1997; O' Cathain and Thomas 2006; Tashakkori and Teddlie 2010; Ritchie et al. 2014).

In contrast, qualitative research has its root in an interpretivist paradigm, based on the view that science is lived experience with subjectivity. Qualitative research employs ‘the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships (Babbie 2007, p379).’ With open-ended observation and analysis, it identifies the meaning, patterns and processes and explains ‘how and why’ questions under the natural (uncontrolled) conditions. Using narrative description and constant comparison, qualitative research creates insight into how individuals experience a phenomenon rather than trying to make population generalisation.

Data sources of qualitative research include observation and participant observation (fieldwork), interviews, documents and texts, and the researcher's impressions and reactions (Casebeer and Verhoef 1997; O' Cathain and Thomas 2006; Tashakkori and Teddlie 2010; Ritchie et al. 2014).

Critical realists argue that the choice of methods should be dictated by the nature of the research problem. In many cases, a combination of quantitative and qualitative methods or techniques are perceived to be the most effective approach. This draws upon the strength of both methods. Quantitative methods help to develop reliable descriptions and provide accurate comparisons. The qualitative methods, from a critical realist perspective, have strength in being open ended, allowing themes to emerge during the course of an inquiry that cannot be anticipated in advance. They also help to illustrate complex relationships that are unlikely to be captured by predetermined response categories or standardised quantitative measures. In this study, for instance, quantitative methods help to understand the government input and TB income as a proportion of the hospital revenues, the extent of non-free, non-standardised prescribing in the TB clinics. Qualitative methods help to unpack the dynamic relationships among the prescribing behaviour of the TB doctors and the specific health system components and processes (or hardware and software elements). Many of these components and processes are emerging and cannot be predetermined.

Recognising the difference in philosophical positions and aims of the two methodological approaches, a combined approach can be managed constructively. Both methodological schools should not be viewed as mutually excluding strategies, but complementary and inter-connecting strategies to address research questions. They should receive an equal standing and co-exist as potential tools in health care research (Casebeer and Verhoef 1997; O' Cathain and Thomas 2006). The combination and sequence of research methods chosen for use should be responsive to the particular research problem or question (Casebeer and Verhoef 1997). A number of objectives or forms of combinations are available in health studies, such as using qualitative and quantitative data to explain the

other. In this study, the quantitative data are used to describe the extent of non-free, non-standardised prescribing practices in the TB clinic; while the qualitative method is used to explain such behaviour through the analysis of the influences of health systems components and processes. However, one should bear in mind that the use of mixed methods can lead to divergent and sometimes conflicting accounts (Moffatt et al. 2006). The issue of research triangulation is discussed in Section 4.5.2.4 Data analysis.

4.5 Research procedures

Based on the research objectives, this study involved two stage of research work. This first stage aimed to understand the extent of non-free, non-standardised prescribing in the designated hospitals. Informed by the results of the first stage study, the second stage sought to explain the prescribing behavior of the hospital-based TB clinicians in the context of integrated service delivery. In this section, I discuss the methods of data collection and analysis involved in each stage of research work.

4.5.1 Stage I study

In this section, I explain the method of patient charts review, which is used to achieve the objective of understanding the extent of the non-free, non-standardised prescribing practices for the uncomplicated TB patients in the two designated hospitals.

4.5.1.1 Patient chart review

The retrospective chart review, also known as a medical record review, is a popular methodology widely used in epidemiology and clinical research to collect pre-recorded, patient-centred data (Worster and Haines 2004; Gearing et al. 2006; Matt and Matthew 2013). Chart review has strength in relatively inexpensive access to the existing rich data, accessing data over a lengthy time all at once, and generation of hypotheses for prospective testing. For instance, chart review can provide reliable information related to diagnosis and treatment in the TB clinic of the designated hospital. In this study, chart review is used to understand the prescribing behaviour of the TB doctors in the TB clinic. This is as measured by the prescribing of non-free, non-standardised TB treatment for

uncomplicated TB patients. As described in the Chapter 1 Introduction, general TB patients, such as those included in this study, do not need to be hospitalised, but only need two months of fixed-dose-combination (FDC) of isoniazid (H), Rifampicin (R), pyrazinamide (Z), and ethambutol (E) during the intensive treatment period, followed by four months of FDC of H and R three times weekly, as per the Chinese National Tuberculosis Control program (NTP) treatment guidelines for all patients, as recommended by WHO. These drugs are provided free, together with essential medical examinations including X-ray in the first, fifth and sixth months of treatment, and liver function tests in the first and second months.

Eligible patient charts were those of the newly registered patients without records of drug resistance to any anti-TB drugs or any serious co-morbidity such as HIV, diabetes, cardiovascular disease, or hepatitis (namely, ‘uncomplicated TB cases’). These inclusion criteria helps to alleviate the problem of case mix that may cause the assessment bias against the guidelines. Considering the feasibility of study, the recruitment period was set for six months, which covered all the smear positive and negative patients newly registered between 1 July 2012 and 31 December 2012. This timeframe would allow the new patients to complete their six months’ standard treatment by 31 July 2013, when the planned data collection process started. The recruitment start time of 1st July 2012 was chosen also because in Yongjia, the government-supported site, a GFATM project was not completed until the end of June 2012. Avoiding the conduct of the study during the GFATM period in one site will reduce the confounding effect of the important co-interventions on the TB management and care processes. In other words, the study tries to focus its efforts on the existing and normal context of integrated service delivery and health systems. Although the recruitment only covered half a year, data collected covered roughly a year, i.e., from the recruitment of the first case on 1 July 2012 onwards and completion of the treatment of the last case recruited case on 30 June 2013 onwards. This period was long enough to capture the seasonal or other changes to reflect the provider behaviour, thus reducing the selection bias of patient charts. In total, 340 medical charts

of uncomplicated TB patients were included for review (including 171 in Yongjia and 169 in Cangnan).

A structured form (Appendix 4.2) was adapted from the previous studies where I was part of the team to elicit data from the patient charts. The form included the basic demographic information of the patients, prescriptions of non-free medical investigations, prescriptions of non-free drugs and hospital admissions. In each site, the CDC staff were trained to assist in collecting the data. They were informed about the inclusion and exclusion criteria, how to deal with missing or conflicting data, and were reminded of the quality control check for accuracy. It was also emphasised that the purpose of chart review was not to audit or assess the clinical performance of the TB clinics, but for the purpose of research aimed at explaining the prescribing behaviour.

Quality control was conducted after the data collection was completed in the two designated hospitals under study. Five percent of the completed data collection forms were randomly selected and rechecked for the accuracy of the content recorded in the data abstraction form. This process helped to correct any misunderstanding of the data collection. For instance, despite the clear instruction on collecting the prescription data on hospital admission by the TB clinic doctors, the data collected still included hospital admissions before receiving treatment in the TB clinics of the designated hospitals. In other words, some admissions were made by the doctors in other hospitals or in other departments of the designated hospitals before they were referred or discharged to the TB clinics. Recording this information would over-estimate the non-standardised prescribing behaviour of the TB doctors in the TB clinics of the designated hospitals since these admissions were not prescribed by the TB doctors in the TB clinics. This problem was corrected following the careful check of the data collected from the patient charts.

4.5.1.2 Data analysis

Data were input into SPSS19.0. Descriptive statistics were used for the cross-sectional analysis of medical charts in each case. Statistical techniques such as chi-square test were

used to compare the non-free prescriptions between smear positive and negative cases. The key indicators were:

- Proportion of TB patients who were prescribed with the second-line anti-TB drugs, liver protection drugs, and immune improvement drugs;
- Proportion of TB patients who were prescribed with the sophisticated medical examinations, such as CT;
- Proportion of TB patients who were hospitalised

As long as a patient was hospitalised, and received any of the above drugs and examinations during the standard treatment period of six months, regardless of the repeated prescriptions, they were counted as ‘having been prescribed’. It is worth mentioning that comparative analysis (e.g Chi-square test) was not conducted between the two study sites, given the apparent heterogeneity. But more importantly, as mentioned earlier in this chapter, this study does not aim to compare the performance or prescribing behaviour of the two sites, but provide an explanation for the prescribing behaviour in the context of integrated service delivery through two-case study.

The patient chart review provides a reliable method to understand the providers’ treatment behaviour. Common concerns regarding this method exist, for example, missing charts, missing information, incomplete recording, and variance in the quality of information recorded by medical professionals (Worster and Haines 2004; Gearing et al. 2006; Matt and Matthew 2013). However, the data collection process did not suffer from these potential problems. This is because the TB treatment information is relatively simple, and there is a strict quality control system from the TB programme regarding the recording and preservation of the medical charts. If there was any information missing, this could be counter-checked or amended from other sources, such as the patient registers and TB control information system.

4.5.2 Stage II study

In this section, I discuss the specific methods (mainly qualitative) used to achieve the objective of explaining the prescribing behaviour of the hospital-based TB doctors in the context of integrated service delivery.

4.5.2.1 In-depth interview with providers

In-depth interviews are a powerful method for generating descriptions and interpretation of people's social world. The in-depth interview is often described as a form of conversation, although it is different from the normal conversation in terms of objectives, and the roles of researchers and participants (Yeo et al. 2014). As compared to focus group discussions, individual interviews have greater potential to elicit in-depth and sensitive information, especially in health service settings, where a relatively strict hierarchy exists and health workers are too busy to gather in the defined time for focus group discussion.

Purposive sampling technique provides an ideal strategy to sample information-rich cases to satisfy the needs of in-depth case study (Patton 2002, Palinkas et al. 2015). The research questions determine that health providers related to TB service delivery are the potential interviewees. As the researcher is relatively familiar with the TB control system, the potential interviewees were firstly pre-determined and identified based on their relevance to the questions. The interviewees were selected from two levels: from within the designated hospital including TB clinics and other relative departments, and the system level, including health bureau and CDC. The maximum variety sampling, also known as heterogeneous sampling, as a purposive sampling technique was used to capture a wide range of perspectives and diversity in the experience relating to the integrated service delivery under study (Patton 2002, Palinkas et al. 2015). However, a 'snow-balling' approach also helped to identify further interviewees. For example, initially I did not realize the departments of pharmacy and medical affairs were responsible for the quality control and rational use of drugs in the hospital. Informed by the early interviews, I went to interview directors of these two departments to understand the mechanism of quality

control of drug prescriptions. Recruitment of interviewees stopped at the point of data saturation when no new information or additional insights were emerging in the data (Palinkas et al. 2015). Qualitative research is iterative where data collection and analysis are occurring simultaneously. This helped the researcher to know the point of saturation and to stop interviewing. The interview samples reflected different hierarchies and function groups related to the TB service delivery. In total, 47 in-depth interviews were conducted with health officials, TB/hospital managers, clinicians, radiologists, laboratory staff and nurses in the two sites (Table 4.2)

Table 4.2 List of interviewees in Yongjia and Cangnan

	Yongjia		Cangnan	
Organisations	Pseudonym	Basic profiles	Pseudonym	Basic profiles
County Health Bureau	Dr. A1	Male, former Vice Director, responsible for public health	Dr. A2	Male, Vice Director, responsible for public health
	Dr. B1	Male, Head, Department of Disease Control	Dr. B2	Female, Head, Department of Disease Control
County CDC	Dr. C1	Male, Vice director, responsible for TB control	Dr. C2	Male, Director of the CDC
			Dr. D2	Male, Vice director of the CDC, responsible for TB control
	Dr. D1	Male, Head, Department of TB Control	Dr. E2	Male, Head, Department of TB Control
	Dr. E1	Male, TB control officer	Dr. F2	Male, TB control officer
County Designated hospital				
Management	Dr. F1	Male, Vice Director	Dr. G2	Male, Vice Director
	Dr. G1	Male, Vice Director		

	Dr. H1	Female, Head, Department of Public Health	Dr. H2	Female, New Head, Department of Public Health
			Dr. I2	Female, Former Head, Department of Public Health
			Dr. J2	Female, Staff. Department of Public Health
	Dr. I1	Male, Head, Department of Medical Affairs	Dr. K2	Male, Head, Department of Medical Affairs
	Dr. J1	Male, Head, Department of Accounting and Finance	Dr. L2	Female, Head, Department of Accounting and Finance
TB and infectious disease control department	Dr. K1	Male, TB doctor, Head of TB Clinic	Dr.M2	Female, TB doctor
	Dr. L1	Male, TB doctor, TB Clinic	Dr. N2	Female, TB doctor
	Dr. M1	Female, Nursing staff (information), TB Clinic	Dr. O2	Female, Nursing staff (information), TB Clinic
	Dr. N1	Female, Nursing staff (clinical), TB Clinic	Dr. P2	Female, Nursing staff (clinical), TB Clinic
	Dr. O1	Male, Head, Department of Infectious Disease Control	Dr. Q2	Female, Head, Department of Infectious disease Control

	Dr. P1	Female, Doctor, Department of Infectious Disease Control	Dr. R2	Female, Head, Department of Hospital Infection Management
Laboratory	Dr. Q1	Male, Staff with permanent contract, TB Laboratory	Dr. S2	Female, Head, Central Laboratory
	Dr. R1	Female, Staff without temporary contract, TB Laboratory	Dr. T2	Female, Staff, Central Laboratory, Rotated to TB Clinic
	Ms. S1	Staff, TB Clinic Registration Office	Dr. U2	Staff, TB Clinic Registration Office
Pharmacists	Dr. T1	Head, Central Pharmacy	Dr. V2	Head, Central Pharmacy
			Dr. W2	Head, TB pharmacy, Rotated
	Dr. U1	Staff, TB pharmacy		
Radiology	Dr. V1	Head, Central Radiological Department	Dr. X2	Head of Central Radiological Department
	Dr. W1	Staff, Central Radiological Department		
Number of interviewees		23		24

There are three main approaches to interviewing that differ largely in the extent to which the interview questions are determined and standardised beforehand: structured, semi-structured, and unstructured interviewing. Each approach serves a different purpose and has different preparation and instrumentation requirements. In the structured interview, the researcher follows a specific set of questions in a predetermined order with a limited number of response categories. However, this seemed too rigid to solicit health providers' experiences with the integrated service delivery in the designated hospitals. While not suffering from the drawbacks of the structured interview, unstructured interviews, sometimes called, 'informal conversational interview' offer maximum flexibility to pursue the information in the natural flow of an interaction from the immediate context without predetermined questions. However, I was concerned that this method would risk being 'too flexible' and cause a loss of focus through the collection of too much information that was not directly relevant to the topic. Therefore it was decided that a semi-structured interview should be used, which is focused and systematic, yet has a degree of freedom and adaptability as compared to structured interviews. In a semi-structured interview, the researcher uses loosely structured topic guide or checklist of topics, containing a mix of closed-ended and open-ended questions (Patton 2002, Kielmann et al. 2012). Questions were loosely structured around the systems-based (CAS) thinking framework, covering the issues related to hospital governance, resource management and organizational culture, bearing in mind their potential influences on the provider's prescription behaviour (Appendix 4.3). During the fieldwork, I managed to tailor the questions to the different backgrounds and expertise of the interviewees. Themes were modified and developed, with newly emerging themes to be incorporated during the research process. The interview topic guides were piloted among three interviewees and were modified mainly with the sequence of the questions adjusted for a better flow. Unlike unstructured interviews, which are less formal, and structured interviews that are more prescriptive, collecting good quality data through semi-structured interviews is not an easy job. This requires appropriate rapport building skills to engage interviewees for effective conversation and good interviewing skills to avoid prescriptive or leading questions (See Section 4.8 on 'Reflexivity').

Interviewees in the CDCs were invited through the Head of TB Control Department of the CDC. Interviewees in the hospitals were invited through the public health department of the designated hospital. Wherever possible, the participants attended the interviews at a given time and in suitable venues, such as a vacant office, meeting room or garden. Tape-recording was used, supported by limited note taking, with permission of the interviewees. Compared to the note-taking approach, tape-recording allows for better follow-up of interesting points and capturing of the ideas of each interviewee more accurately. However, mainly relying on recording may risk being too late to ask a follow-up question since the tape-recording is not immediately transcribed. With help of the limited notes, I have tried to reflect the key points of the interviews after I returned to the hotel. This allowed me to follow up the unclear points with the interviewees in the next day.

4.5.2.2 Documentary and administrative/routine data review

The documentary review helps to understand the policy context of TB service integration and management in the designated hospitals. Documentation contains detailed information and broad coverage of events, providing information that simply cannot be attained from other sources. Regardless of the reporting and selection bias, documents are unobtrusive (as they are produced before the study). As Yin points out, in case studies, the most important use of documents is to corroborate evidence from other sources (Yin 2003). The documents were identified and reviewed continuously throughout the research process. Some documents were available for review before the period of data collection; during each interview, the respondent was asked to recommend any further key documents of relevance of the study. Published and unpublished documents were collected. Examples of published documents included official notice to set up the TB clinics, and official notices to strengthen the public health work in the general hospitals by the health bureau. Unpublished documents included supervision records from the CDC, performance assessment and bonus allocation guidelines of the general hospital.

In addition, the routine TB control data such as TB notification and control outcomes were collected from the electronic system since the setup of the TB clinic in the designated hospital. The hospital performance information, such as patient visits, hospital revenues including the government input and TB service income, and TB hospitalisation, was also collected with the help of the CDC staff in the two counties. These quantitative and longitudinal information provide useful understanding of the TB control, hospital and systems context where the integrated service is being delivered. The main weakness of administrative data lies in the difficulty of quality control and double-checking of the data.

4.5.2.3 Non-participant observation

Observational evidence is often useful in providing additional information about the topics being studied. Non-participant observation can cover events in real time, and provide some insight into the meaning of the context studied, and the current interactions between different actors, for example, in a consultation. Given the part-time nature of the PhD during the data collection period, participation observation was not feasible. Therefore, this study used observation informally, to a limited extent, mainly to compare and contrast findings from the interviews. For example, during the fieldwork, I have mainly observed the TB clinical consultations, working environment and conditions such as infrastructure and workspaces of the TB clinics, doctor-patient communication, and work atmosphere. These observations, although limited, provide useful contextual and processual information on the integrated TB service delivery. During observation, a diary of notes was kept. One common concern of the observation is the ‘Hawthorne effect’ as people may act differently as they know they are being observed (OSWALD et al. 2014), especially when I observed the TB consultation in the TB clinics. However, this effect should be alleviated with good rapport built with the TB staff and the clearly explained objective of researching rather than auditing the TB practices (See Section 4.8, Reflectivity).

4.5.2.4 Data analysis

Thematic analysis, (rather than ‘grounded theory’), another common qualitative analysis approach, was adopted in this study because it better suits the study objective of using a systems-based(CAS) framework to assist the understanding of the prescribing behaviour of the TB doctors in the context of integrated service delivery in the designated hospitals in China. Thematic analysis is a qualitative analysis method for ‘identifying, analysing and reporting patterns (themes) within data’ (Braun and Clarke 2006,p79). It organizes and describes the data into a rich and detailed account but often involves interpretation of various aspects of the research topic. It is similar to the grounded theory approach as an analytic method of seeking to describe patterns across qualitative data. However, grounded theory has a specific aim to generate a plausible and useful theory of the phenomena that is grounded in the data (Braun and Clarke 2006). It is also characterised by the cyclical and iterative analysis, which feeds into the subsequent sampling, future data collection and the testing of merging theories. This is not suitable, given the study objectives and a pre-defined, systems-based (CAS) framework applied to guide the study.

Guided by the conceptual framework, the study started with the deductive approach for the analysis. It tends to provide less a rich description of the data overall, as compared to the ‘open-coding’ of all the data (inductive approach). However, it provides more detailed analysis of some aspect of the data related to the conceptual framework (Braun and Clarke 2006). Since the conceptual blocks are broad, many issues have emerged during data collection and analysis. In this case, the inductive approach was used with coding and analysis ongoing. The combination of a deductive and inductive approach generates rich and in-depth accounts against the health systems problem under study (Gale et al. 2013).

The procedures of thematic analysis are akin to many other qualitative analysis. It usually covers a systematic process of familiarisation, developing and refining themes, coding and interpretation. Nvivo 9 was used to assist the data analysis, despite its limitation relating to the analytic work (Gibbs et al. 2002).

First, I read through the interview topic guides and transcripts of the interviews, and conducted ‘thick descriptions’ exercise of a number of interviews in each study sites. I read the transcripts carefully, sentence by sentence, and interpreted the interviews and described the meaning of the specific datasets. ‘Thick description’ provided a deeper understanding and interpretation of the content of the interviews (e.g. intention, tension) in the context and helped to generate the initial thematic codes. With the reading ongoing, a specific thematic framework was progressively established. The thematic framework covered specific themes and sub-themes informed by the conceptual framework. This thematic framework was piloted and revised with eight interviews of different stakeholders. The revised themes and sub-themes and all the transcripts were then input into the nodes and tree nodes of Nvivo 9. Rather than ‘coding’ all the transcripts into the full thematic frames at one time, I focused on coding the relevant content of the interviews into a main theme and its associated sub-themes at one time. This approach provided thorough but focused and accurate coding analysis by identifying and coding the most relevant interview transcripts into the related themes. For instance, under the theme of governance, and its sub-themes of inter-organizational relationships, the most relevant interviews should come from those managerial staffs such as managers of health bureau and CDC and hospital. However, this did not mean that other interviews were neglected; instead, the transcripts of other interviews were examined thoroughly, and if relevant, coded. Similar exercises were repeated with different themes.

The coding exercise turned out to be an iterative process: the themes and sub-themes were revised and refined with the coding exercise progressing. The transcripts and coding exercise itself were in Chinese. Translation to English was only conducted after coding to maintain the original meaning and taste of the interviews and to ensure the accuracy of the coding. The data grouped into the themes and sub-themes were further interpreted and organised after comparing between different sub-themes. For instance, the main theme of ‘governance’ included ‘systems-level’ governance and ‘hospital-level’ governance, and this was further refined as ‘working relationships in the integrated service delivery: shaping the governance’ with analysis progressing. These newly refined themes or sub-

themes became the potential themes or sub-themes (title or sub-titles) of the chapters of the thesis. It is worth mentioning that some themes(codes) are more open to subjective interpretation than others, for example, 'motivation and satisfaction of TB health workers', 'medicalisation of TB' and 'clinical governance of TB control'. Other codes such as 'payment', 'infectious risk' are more descriptive, in other words, they describe phenomenon that are more concretely defined and less open to interpretation. The similarities and differences of the data under the specific themes were constantly compared and summarised. This is reflected in the presentation of the results, which provide rich and in-depth understanding of the prescribing behaviour in the context of integrated service delivery.

Thematic analysis has great flexibility of combining both the inductive and deductive approach, regardless of philosophical stances. While it simplifies the analysis, this is also subject to criticism, as there is a risk of reducing data to prescribed themes and missing new or emerging ideas. Therefore, reflexivity is important to ensure that themes are driven by data rather than presumptions. In this study, while data collection was guided by the systems-based (CAS) framework, combining deductive and inductive approach and iterative analysis helped me to ensure that the themes were both theory- and data driven. On the other hand, thematic analysis has limitations in exploring the complex dynamic pattern of the data. However, adopting the CAS theory, and making use of causal diagrams helped to address this problem (See Section 4.6).

In addition to the interview data, other data were also collected including routine data, documents and observational data. The routine TB control data and the hospital performance information, such as the hospital revenues and TB hospitalisation, were analysed using the descriptive statistics. This, together with data collected from the documentary review and non-participant observation, covered the general context of integrated service delivery. These data were used and integrated with interview data wherever appropriate for triangulation and supplemental purposes. For instance, one striking set of data from observation was the poor communications between the TB doctor

and patients in one site; while in another site, the communications appeared to be more harmonious with many complimentary ('thanks-giving' for TB doctors) flags hung on the office wall. These data were consistent and well integrated with the interview data.

It is noteworthy that the purpose of using multiple methods and sources ('triangulation') is not necessarily to cross-check information. It is generally expected that the data obtained will be different and in some cases conflicting, but this is because different accounts will inevitably differ due to the different nature of the sources and methods – they are all pieces of the same 'puzzle'. Therefore, different methods and sources of data collection may not easily formulate a convergent picture, and it is up to the researcher to untangle why they differ. As Keen and Packwood (2006) argued, it is better to perceive triangulation as a way of providing comprehensive evidence and encouraging reflexivity with data analysis carrying on to identify convergence, divergence and contradiction of data from different sources and methods (Keen and Packwood 2006). One convergent example is the consistent evidence on 'poor doctor-patient communication' between the data collected from observation and interviews. It was found that the hospitalisation rates of TB cases collected from the patient charts were much lower than those from the hospital administrative data. However, this divergence was due to the different criteria of assessment: patient chart review only included strictly selected 'uncomplicated' new TB cases, while the hospital routine records included all types of TB cases, regardless of new or retreated TB, complicated or uncomplicated TB. These two different sets of data were used in this thesis to provide a comprehensive picture of hospitalising TB patients in the designated hospitals.

4.6 Synthesis of data analysis

As concluded in the previous chapter, this study started with a simplified systems-thinking based framework (Figure 3.1). The framework has informed the development of the research tools, including interview topic guides and analysis of the data. Influenced by the CAS theory, as data analysis progressed, the conceptualization of data has become more complex and dynamic, organic and adaptive. Informed by the data analysis, especially

qualitative analysis, a CLD was developed using Vensim PLE (Varghese et al. 2014), to plot the dynamic relationships of the health systems components and processes that influenced the prescribing behavior of the TB doctors in the context of integrated service delivery. As indicated in Chapter 2(Section 2.4.2), a CLD helps to visualize the complex system patterns and characteristics in the health systems. For this study, the purpose of the CLD was to assist in the identification and interpretation of the relationships, interactions and feedback loops or the underlying mental model that foster the emergence of non-free, non-standardised prescribing behavior in the context of integrated service delivery.

To draw the CLD, I first derived the key variables from the coding lists of the thematic framework that was informed by the conceptual framework (Figure 3.1). Namely, development of the CLD was based on the key themes of the study, such as context of integrated service delivery, medicalization of TB care, and motivation of TB health workers, clinical governance of TB care in the designated hospital. Then the relationships between and among variables were configured, based on the data. In the CLD, the standard notation is used, where positive arrows indicate that two variables change in the same direction (e.g. poorer payment, poorer motivation), and negative arrows denote that two variables change in opposite directions (e.g., stronger tension, weakened governance). Finally, the feedback loops, either positive or negative, were identified. Reinforcing loops, accompanied by a positive (+) sign, indicate that variables have an overall reinforcing effect rather than self-regulating. Balancing loops, accompanied by a negative (-) sign, indicate that variables have an overall dampening effect. The loop symbol is either clockwise or counter-clockwise, depending on the direction of the loop. The loops, with thicker lines, were numbered in the order in which they appear in the text. Variables in bold are those appearing among the feedback loops and/or important variables that can be treated as ‘leverage points’.

Specifically, the CLD visualises the pathways of influences on medicalisation of TB care, motivation of TB health workers, clinical governance of TB care in the designated

hospital, which collectively contribute to the non-free, non-standardised prescribing behaviour of the TB doctors, in the context of integrated service delivery. While the full CLD (Figure 9.1) is presented in Chapter 9, for the purpose of illustrating each of the above mentioned theme, I present the sub-sections of the diagrams in Chapter 6, 7 and 8 respectively (Figure 6.1; 7.1; 8.1).

Based on the CLD analysis, and on the iterative basis, the original framework was refined to illustrate the dynamic influences of the health systems components and processes on the providers' prescribing behaviour in the designated hospitals. This is presented as a refined conceptual framework in Chapter 9(Figure 9.2).

4.7 Ethical considerations

Ethical approval was sought from the Ethical Committees of Queen Margaret University, UK and one of the designated hospitals under study (Cangnan). Ideally, the prefectural or provincial CDC should make the local ethical approval. However, there was no ethical committee at the prefectural level. There was an Ethical Review Board in the provincial CDC, but they did not accept the formal review of the application since this was a PhD research project, which did not enter the formal collaborative relationship with the provincial CDC. However, the TB programme officers at the provincial CDC and the two county CDCs reviewed the application carefully and approved the study. At the hospital level, there was no Ethical Review Board in Yongjia, but one in Cangnan. As a result, the Cangnan hospital approved the ethical application(which covers the study in the two counties); while the leaders in the Yongjia hospital reviewed and approved the study for the administrative and technical purposes.

All the medical records are well preserved in the hospitals. There was no need for a separate consenting procedure from the patients since the CDCs and the two hospitals agreed the medical record review as part of the research. Patient names were not included in the data extraction forms. Informed consent was sought from the interviewees. Specifically, I explained the objectives of the interview to the participants; emphasised

the confidentiality of the information by the use of pseudo names. I also pointed out that they were free to withdraw from the study anytime without fearing any consequences. The interviewees also read the information sheet, and signed the consent form, if they agreed to be interviewed. However, if the interviewees did not feel comfortable to sign, oral consent was used. This would help to protect people working in the bureaucratic systems and collect objective information as much as possible. In this case, I would sign on an adapted consent form to return to the interviewees to reassure the agreement as explained in the information sheet. All participants agreed to be interviewed and no one withdrew from the study.

Data collected are kept confidential and used for research purposes only. However, despite the use of the pseudonyms, the identity of the key informants cannot be fully concealed in this study. This is because their positions, titles and affiliations are important to reflect the different perspectives of the different roles and hierarchy of the interviewees. For the thesis purpose, these information will be kept, and in the future publications, these will also be kept. However, the name of the province and the hospitals under study will be anonymised, for instance, to replace 'Zhejiang' province as 'eastern' province, and Yongjia and Cangnan hospitals as 'Hospital A' and 'Hospital B'. Audio recording of the interviews are stored in the recorder and the personal computer. Patient materials such as data extraction form of the medical records are stored in a secure locker. The electronic transcripts and other electronic materials such as work reports and analysis tables are also stored securely in the personal computer. The identities of the study participants will not be shared with anyone else. Data analysis and composition were conducted in China and the UK, as I travelled between China and the UK for work and study reasons for the first few years of study.

4.8 Reflexivity

Reflexivity refers to recognition of the influence of a researcher on the research process as the context of knowledge construction. For instance, the preconceptions of the researcher may influence the choices made within the study, such as the research question

itself and the methods of data collection (Malterud 2001). Such preconceptions can be influenced by the previous personal and professional experiences, motivation and qualifications for the study, and perspectives and theoretical foundations. On the other hand, the potential power relationships between the researcher and research participants may also shape the process of data collection (Kuper et al. 2008). At the beginning of the thesis, I have acknowledged the influence of personal and professional experience on the motivation of the study. I have also explained the development of the original research question and conceptual framework with the study ongoing. At the beginning of this chapter, I also clarify my philosophical stance and its influence on the choices of methods made within the study. This section mainly reflects the potential power relationships between the researcher and research participants, as well as the influence of previous knowledge on the research process.

Reflection on the use of fieldwork 'gatekeeper'

As mentioned in the Chapter 1, I had been working closely with the TB programme/CDC in conducting operational research for TB control in China. In particular, I have used the CDC staff as the gatekeeper and liaison for the research. This has provided me easy and convenient access to the hospital providers, as the CDC is the focus point for public health management in the county. However, this may threaten my neutrality of research as my initial views were more or less influenced and shaped by the CDC staff, who had strong views on the issues of excessive treatment for TB patients. Even in the write-up stage of the thesis, I had come across this similar problem. Thanks to the supervisors' comments, I tried to position myself to be 'impartial' and 'objective' during the fieldwork and write-up. In addition, using CDC staff as gatekeepers may have provided a 'false' impression that I was sent by the upper level (provincial) CDCs to conduct the research. Bearing this in mind, I had tried to establish rapport with the relevant interviewees and explained that this was an academic PhD project, rather than programme supervision. In some cases they had talked in the way of 'reporting' the work to a 'health official' by saying something like 'you CDC people', 'you from upper level'. If this happened, I would again clarify my

academic and research position and guide the discussion back to the more ‘equalised’ discussions.

Reflection on rapport building with the field participants

I was lucky enough to have convenient access to the sites and participants thanks to the support of the provincial and county CDCs. However, the research process was not completely smooth, and rapport was not built within one day. The field work nearly covered 15 months, including collecting and analyzing the medical records to inform the interview design, conducting background interviews and formal interviews between July 2013 to September 2014. Before the sites were agreed, there were also frequent email and telephone communications and field visits with the local CDCs and hospitals. This prolonged process provided a good opportunity to build rapport with the field participants. Among many other rapport building skills, I found being sincere and frank, understanding and respecting people, and showing an eagerness to learn and share were most helpful to set up good relationships with the field participants. However, I have also come across ‘difficult-to-communicate’ or ‘indifferent’ interviewees who were important to the study. In this case, I have sincerely invited them for informal conversation, tea or dinner. In general, I made friends with most of the interviewees. Many interviewees expressed their gratitude that they benefited from the in-depth discussion of the common health systems problem, which helped them to think about their management and practices critically.

Reflection on interview settings

Interviews were mostly conducted in a separate room or quiet place. However, in the busy health service setting, not all the participants could be interviewed at the specific time and ideal places. In some cases, I had to interview the health workers in their consultation rooms, where they were working. I tried to arrange the interview in the afternoon when they had the least number of patients²⁰. In case of a patient visiting, we would stop talking and the doctors would receive the patients. This however gave me the opportunity to

²⁰ Most of the patients visit the TB clinic in the morning due to the need of sputum check which includes a morning sputum sample.

observe the interactions between TB staff and patients. While concern remained at the interruption of the flow of interview, this did not necessarily affect the content and quality of interview. This was because the interview topic guide was relatively structured and if there were any unclear points, I could always come back to the participant the next day to clarify, or probe further points.

Reflection on the potential influence of the previous knowledge and experiences

I have experienced a painful period of shifting from 'quantitative' to 'qualitative' research mindsets. When I commenced on this PhD study, I brought 'quantitative mindsets'. When I initially designed the interview topic guides, I tended to ask abstract, 'close-ended', leading questions, and ask 'relationship' questions directly, as if I would expect the interviewees to provide direct answers to any research questions. Following the learning and discussions with the supervisors, I have tried to avert these problems and explore the accounts of the participants in an open way to obtain good quality of data (Box 4.3). Overall, I enjoyed most of the interviewing discussions, which generated many interesting and new experiences and insights.

Box 4.3 Examples of positive interviewing practices gained

- Avoidance of leading questions; asking open-ended questions.
Example: Instead of asking questions like 'Will funding arrangements have any influence on prescription behaviour?', I asked the questions like 'what do you think have influenced the prescribing practices?', before probing the potential factors related to the conceptual framework.
- 'Translating' abstract concepts into practical questions.
Example: In trying to understand 'organisational culture', I explored more concrete dimensions of 'organisational culture' as appropriate to the local setting, such as medical culture, teamwork or atmosphere.

- ‘Probe & follow-up’ techniques were used throughout the interviewing processes to deepen the response to a question and increase the richness of the data being obtained.

Example: When an interviewee said smear positive patients should be admitted to the hospital, I further asked the interviewee to explain why that was, in more detail.

- Avoidance of sensitive questions for relevant interviewees.

Example: When I realized the informal payment and drug incentives from the pharmaceutical companies might be a problem, I only explored this issue with the CDC staff, rather than the TB doctors. However, these data were too weak to be reported in this thesis as this was difficult to be verified through other means.

- Encouraged the interviewees to talk freely and openly, let them ‘travel’ with conversation with my control, and wherever possible, encourage them to tell the story and give examples to illustrate their points.

Example: I asked the interviewees to give examples of TB medical complaints, if any.

Concerns also arose regarding the objectiveness and rigour of the data collected, given the use of the conceptual framework, pre-defined questions and my pre-knowledge about the research problems. In general, the interviews were open-ended to allow new themes and data to be emerged throughout the study. In fact, a number of interesting theme have emerged beyond my expectation, such as the influence of the doctor-patient relationship, and the issue of the health workers’ motivation on the prescribing behavior of the hospital-based TB clinicians. The research has allowed me to constantly reflect and modify the conceptual framework and update my knowledge on TB control based on the research findings.

Chapter 5 Integrated TB services in Yongjia and Cangnan hospitals: historical and policy context

This chapter situates the study within historical and policy context of health services reform in China since 2009. I start with an overview of the public hospital reforms within which service integration occurred. This section is followed by the delineation of the history of the integration of TB service in the general hospitals, as well as the challenges of implementing public health activities in general hospitals. Finally, I describe the two hospitals under study, including their developmental profiles, financial performance and motivation related to TB control.

5.1 Public hospital reform in the study sites

When I conducted this study, the two hospitals were two of the national pilot sites implementing the public hospital reform which covered 1104 counties. Cangnan and Yongjia County were among the first and second round of national pilots for the public hospital reform in 2012 and 2013 respectively. Located in the designated hospitals, TB service provision was likely to be affected by the reform, which aimed to improve the quality and patient-centred care.

As discussed in Chapter 1, public hospitals in China have been profit-oriented due to the limited government input in the context of marketised health services. Before the public hospital reform, hospitals had to mainly rely on drug sales for cost recovery and were allowed to charge an addition of 15% of the drug cost from the patients (Song et al. 2014). The public hospital reform launched in 2009 encouraged public hospitals to reduce their reliance on drug prescriptions. On the other hand, the reform aims to increase the consultation and service charges, with support of government funding to subsidise the loss of income (Barber et al. 2013).

For instance, the reform in my two study counties was implemented through a policy of ‘one reduction, two adjustments and one compensation’. ‘One reduction’ meant reducing

patients' medical costs through implementation of the zero price mark-up policy (by cancelling the additional charge of 15% of the drug cost), to prevent profit making from drug sales and improve the rational use of medicines. 'Two adjustments' meant increasing the consultation and service charges to reflect the genuine cost of care delivery and value the contribution by the medical staff; and adjusting the health insurance reimbursement to cover the newly increased service cost so that patients' financial burden would not be increased. 'One compensation' referred to increasing the government input for the public hospitals to compensate the loss of revenues especially due to the cancelling of the 15% price markup, and to improve the 'public' nature of the public hospitals.

In both hospitals, the zero-price markup policy covers both the essential drugs and non-essential drugs, including non-free drugs such as liver drugs, immune improvement drugs as often prescribed by the TB doctors. These drugs were purchased by the designated hospitals through the provincial open bidding platform. However, it is noteworthy that basic TB drugs are provided for free, and purchased by the provincial CDC and directly allocated to the county designated hospitals via county CDCs. In the meantime, the hospitals increased the treatment/consultation prices by 30% (although the daily rate for the hospital beds should not exceed RMB40 per day), to compensate the operational losses caused by zero-price markup policy. The governments were also committed to subsidizing the losses from the zero-price markup policy. However, this was hard to achieve due to the poor financial capacity of the local governments. In Cangnan, for instance, the field visits suggested that only 70-80% of the 15% drug price mark-up loss was compensated by the increased medical service cost. The local government actually failed to subsidise the remaining gap of 20%. This information is not up to date, as to whether and to what extent the government can make up the gap of the income loss due to the reform. However, based on my knowledge and communications with people working in the health services, this problem is common, although the level of the government compensation varies across places.

Yongjia and Cangnan had included outpatient TB services in the rural health insurance

(NCMS) reimbursement since 2012. In the past, health insurance did not commonly cover TB care when the service was still provided by the TB programme, which was not perceived to be part of the medical reimbursement system. The health insurance provided a higher level of reimbursement for TB patients than other general outpatients, who normally received the minimum reimbursement from their 'personal accountant' of the health insurance scheme. In both hospitals, TB patients can now be reimbursed up to 80% of the costs of treatment, which is not covered by the free treatment policy in the TB clinics. In Yongjia, however, TB patients need to pay the full cost first before claiming the money back from the health insurance bureau since 2014. This provided great inconvenience for the poor TB patients. In Cangnan, the TB patients only need to pay the out-of-pocket cost after deducting the insurance cover in the TB clinic. It is worth mentioning that migrant TB patients were not entitled to receive the local health insurance reimbursement, although they enjoyed the free treatment policy in the local designated hospitals.

5.2 Integration of TB services within the general hospitals

In Yongjia, as the Health Bureau officials and CDC staff suggested, the fact that the CDC was clinically under capacity was the main reason for moving towards integration of TB services within the hospital. Unlike the hospital, the TB clinic in the CDC was lacking in clinical support and coordination from other departments. Specifically, it was beyond their capacity to deal with complicated patients, without wards to admit complicated patients. There was strong consensus between the CDC and Health Bureau that the TB service should be integrated into the general hospital. Initially the hospital was hesitant, and resisted due to concerns about the limited resources (staff, space and infrastructure), and increasing an already busy routine workload. However, given the strong pressure and increasing trend of TB service integration at the provincial level, the hospital management became receptive towards the new service delivery model. They started to welcome the ideas of the integrated model, which played to the strengths of both the hospital and CDC in TB control. Key persons in the hospital played an important role in facilitating the change, for example, Dr. G1., the then Vice Director of the hospital responsible for

medical affairs. During our conversation Dr. G2. revealed his great strategic vision of supporting integration, and determination to overcome the resistance for change through motivating and relocating health workers to work in the TB clinic. He said: *‘I told doctors that it was meaningful to do this work.... if you cure one patient, you would have a great sense of achievement...’*

Initially, the CDC and hospital did not plan to set up an independent TB clinic as is the case now. Rather they wanted to integrate the TB clinic in the infectious disease control department, considering the stronger technical capacity of the infectious control department and reluctance of many doctors to work in an independent TB clinic. However, the head of the infectious disease control department declined to undertake this new service. They were concerned that this would occupy the already limited beds and increase their workload due to the increased public health procedures and regulations associated with the TB care, such as case reporting and form filling.

In Cangnan, the TB service model has experienced a shift from ‘highly integrated model’, to ‘centralised TB programme model’, to the recent ‘integrated with one designated hospital model’. TB services were provided in four ‘designated’ hospitals and the anti-epidemic station (later called ‘CDC’) about ten years before the recent integration in 2011. The diversity of TB service providers has added to the challenges of management, plus the fact that many other clinics and drug stores also provided TB treatment and drugs. Facing this challenge of unregulated TB service market, the health authorities stressed that the TB service should be centralised and provided by one designated health facility only. The CDC decided to take back the TB service provision from those hospitals. However, several hospital directors, who challenged the poorer clinical capacity of the CDC, opposed this plan. Thanks to the powerful coordination of the Health Bureau, TB service provision was finally taken back to, and centralised within, the CDC. Meanwhile, great administrative efforts were made to improve management of the TB service, for instance, stopping the supply of TB drugs in the non-CDC clinics (including drug stores). Gradually the TB service was fully centralised within the TB clinic of the CDC.

A few years later, service integration in the hospital was again put on the policy agenda. The CDC was regarded to have insufficient capacity to treat complicated patients, with only one or two clinical doctors based in the CDC, who were generally lacking in clinical experiences, and lacking in the drugs to prescribe. Nevertheless, the county hospital had an infectious disease control department, which was generally well connected with the CDC and in a better position to provide a TB service. It was hoped that integrating the TB service in the infectious control department of the designated hospital could enable the provision of more standardised treatment for TB patients.

Influenced by the health authorities from the upper levels (provincial and prefecture), both the county Health Bureau and the CDC staff had strong views that the TB service should be transferred to the hospital. The leaders of the Health Bureau and CDC attached great importance to this initiative since Wenzhou prefecture was one of the pioneering cities in service integration. In the leadership meetings involving different stakeholders, they discussed the operational and transitional issues and signed an agreement to specify the responsibilities of different stakeholders to implement the integrated services. However, there was strong resistance from the hospital, which did not want to take back the TB service any more, due to the pressure of dealing with the infectious disease and complicated public health procedures. They made a strong case that their infrastructure and staff were not ready to take up the new service. Given the resistance from the hospital, through numerous talks and communications with the hospital, a lot of pressure was exerted on the hospital. Health bureau officials even warned that if the hospital was not willing to undertake the TB service delivery, they would integrate the TB service into the traditional Chinese medicine hospital instead. Dr B2 (Head of Disease Control Department, Cangnan Health Bureau) recalled,

‘I remember, on a Thursday, the CDC asked People’s Hospital to take over the TB clinic unconditionally and to receive patients on the next Monday even if the hospital was not ready. It is compulsory, but the hospital complained the staff and facilities were not ready,

but our leader said you must take it over.'

Finally, despite the reluctance of the hospital, the TB clinic was set up and operated in the infectious disease control department.

In Yongjia, during the initial period of integration, the CDC sent some of their staff to be based in the designated hospital, in order to provide technical support and guidance on aspects of service delivery including clinical work, sputum test, and drug and information management. As Dr. K1 (TB doctor, Head of TB Clinic) reflected, *'Dr. D1 of the CDC came here to train me for two months until we became familiar with the work. Dr. D1 is a 'know-all' for TB treatment and trained me on receiving, diagnosing and treating patients and information management.'*

The designated hospital also received technical and financial support from the GFATM (2010 - 2012). The GFATM project aimed to enhance the quality of care through enhanced supervision once per month from the CDC to the designated hospital. The GFATM project held the management and coordination meetings on the quarterly basis to address issues related to the service operation such as laboratory test and information management. The TB doctors received an additional RMB 600 per month for the implementation of GFATM project. The CDC staff suggested that the project has largely helped the designated hospital to transit from the initial period of integration to the stage of being more on track.

In Cangnan, at the beginning, TB services were not provided in a standardised way. According to Dr. B2 (Head of Disease Control Department of the Health Bureau), the biggest problem was that the hospitals adhered to their own way of doing things rather than following the guideline of public health system. Practices in the hospital were not as standardised as those of the CDC, especially regarding the specific public health procedures, such as data entry, patient flow between wards, and communication with the CDC. There were also problems of TB case follow-up as the hospital doctor would tend to wait for patients to come rather than tracing them. In addition, the hospital failed to

conduct medical tests and examinations for TB as per the guideline requirements, such as sputum test, liver function test and X-ray examination.

Facing these problems, the Health Bureau officials were in frequent communication with the hospital leaders. They urged the hospital to train the staff and equip the TB clinic with the facilities and equipment as necessary, and suggested designating a senior staff member to take up the overall responsibilities of the TB clinic. The Health Bureau also sent several CDC staff to support the information management, and other technical and logistical work of integration. The CDC responded to any problems raised by the TB clinic efficiently. If the problems remained unsolved, the CDC would seek help from the vice director of the hospital. The public health department of the hospital also provided support as needed. Although the TB clinic failed to operate well in the first few months, it did improve after one year's integration, with regular monitoring and supervision from the CDC.

There was common recognition among the CDC and hospital staff that there should be specific funds to support departments closely related to public health, such as TB clinic and fever clinics. In both sites, the CDCs transferred the costs covered by the free treatment policy to the designated hospital, although the funding related to case management such as follow up and education was still kept in the CDC. The designated hospital in Yongjia received the government funding in the name of supporting the TB/public health services, while this was not the case for the hospital in Cangnan.

In Yongjia, the integration initiative has received strong support from the government. Prior to the integration, there was no earmarked funding from the government to support the public health work. All the stakeholders including Health Bureau, CDC and designated hospital were very active to argue and mobilise funding from the county government to support the newly integrated TB service. Dr. C1 (Vice Director of Yongjia CDC) was a pro-integration supporter who lobbied several government departments to support the integrated service. He even made friends with the colleagues in the financial bureau, which was located on the opposite of the CDC. As a result, the local government invested

RMB600,000 to purchase the equipment and other facilities for the newly setup TB clinic. Since 2010, the hospital was given RMB 800,000 per year to conduct the TB work in the name of supporting public health. Dr. G1 (then Vice Director the hospital) commented:

'This (funding) was much related to the setup of the TB clinic. We requested the money from the Health Bureau with the help of the CDC, and the Health Bureau vice director was very supportive of this, and finally the vice county governor convened a meeting and made an important decision'.

However, there seemed to be an ambiguity regarding the ring-fencing of the funding for TB. As Dr. C1 (Vice Director of Yongjia CDC) pointed out, although the funding was intended for the TB clinic, they had to apply *'in the name of increasing staff salary, and in the name of public health work in the hospital. But we cannot argue for TB work only.'* The TB/public health funding was budgeted into the annual health plan of the county. However, whether this funding will be sustained completely depends on the financial and administrative capacity, and the priority of TB/public health work of the county.

In Cangnan, no earmarked fund was received from the government to support the setup and operation of the TB clinic. Dr. G2 (Vice Director of Cangnan hospital), complained that the hospital invested too much money in the TB clinic to cover the related equipment and human resources. The biggest investment lay in staffing, with several hundred thousand Yuan spent on salaries and social securities for the TB clinic staff per year.

The Health Bureau leadership in Cangnan perceived integration as an administrative order that should be followed by the public hospital. On the other hand, they believed the hospital had enough financial capacity to operate the newly integrated service, which was deemed to cost little. As Dr. A2 (vice director of the Health Bureau) commented:

'We made it clear that it was not possible for us to pay for such costs as start-up activities cost. The hospital would not care about this little money. If the hospital director values

the TB work, they would not care about such two Yuan [slang, meaning little funding]. Several hundred thousand Yuan is a big figure for the CDC, but it is such tiny money for the hospital. Therefore they rarely argue or apply for money from us. We say this is your task, don't talk about money with us. We will give you what is supposed to be given to you. You should be responsible for the funding yourself.'

The government provided routine but limited funding to support the general functions of the public hospitals annually. However, there were unclear specifications and purposes of the routine funding, which contributed to comprising the interests of public health work. Most of the funding was used to support medical services, such as the purchase of important medical equipment in addition to basic subsidy for the human resources. As B2 (Head of Disease Control of the Health Bureau) complained,

'I think the biggest problem is that we are lacking in relevant regulations. I've discussed with the financial department that it's better to specify the % for funds allocation. For instance, 10% for public health and TB clinic, which includes TB and public health doctors' salary... Since the hospital is funded by the government, it will follow the requirements as long as being specified. But we know it is not easy for the hospital to do it heart and soul.'

On the other hand, this problem reflects the lower priority of public health work, such as TB control, as compared to the medical work in the hospital. As Dr B2 complained, *'No one cares about how much funding is allocated to public health, and mostly, funds are allocated to medical treatment.'*

5.3 Challenges of implementing public health activities in the general hospitals

During my field visits, health workers in both hospitals kept complaining about the increasing public health workload. This section introduces the recent government initiative of integration of public health activities in the general hospitals, as well as the challenges in funding and staffing of implementing the public health work in the general

hospitals.

5.3.1 Wider integration of public health activities in the hospitals

Since 2013, the provincial government has been facilitating the wider integration of public health activities in the general hospitals. This policy aims to improve the seamless integration between public health services and clinical services in the public hospitals²¹.

Yongjia County aimed to develop the general hospital (the hospital under study) into a ‘standardised’ hospital for public health and clinical service integration by 2014. Great efforts were made to motivate doctors to undertake public health work in the hospital. As a chronic disease control model county, the county has been strengthening the health promotion and the chronic disease control system where any patients above 35 years old should receive blood pressure test in the hospital. In 2014, two new public health projects were implemented in the hospital, i.e., child tooth decay prevention and food born disease surveillance. HIV/AIDS will be integrated into the hospital soon, but this was regarded to be challenging due to the nature of HIV/AIDS control, i.e. high degree of confidentiality and social stigma of HIV/AIDS. Dr B1 (Head of Disease Control Department of the Health Bureau) was concerned that:

‘I don’t know whether it will be successfully integrated. I feel it is different from the TB. I feel it is not suitable to be integrated in the hospital. When an HIV/AIDS patient is admitted, other patients would not come here. TB is better as it at least can be treated and cured and HIV/AIDS is different.’

²¹ including organization and funding, public health emergency response, disease control (e.g., infectious disease reporting, infectious disease treatment, important infectious disease prevention, immunization and chronic disease); health supervision; patriotic health campaign; maternal health; hospital infection control and biosafety; public health information system and training; designated tasks (TB designated hospital, disease surveillance); public health performance appraisal.

Cangnan County was also part of the wider integration as a county under Wenzhou. Undertaking public health work in the routine clinical practices was perceived to be challenging. As the Head of the Medical Affairs Department of the hospital pointed out, resistance for this initiative was common, as clinical doctors just wanted to conduct clinical work and it took time for them to adapt to the public health concept and practices. He explained that sometimes, clinical doctors did not understand the public health procedures, and their consultation time was too limited to fulfil the public health procedures. Especially with the increased doctor-patient tension, this work was more difficult as patients could easily quarrel with doctors for small issues. For example, a patient complained about the procedures of blood sample tests for public health purposes and questioned the legality of charging 20 yuan for such a test. As Dr. B2 (Head of Disease Control of Cangnan Health Bureau) emphasized, integration should bring together the work and contribution from the medical affairs department and public health department. Integrated services went beyond clinical care, which only tended to focus on curing patients on an individual basis, and introduced concerns about follow-up, education of patients, and connecting processes as a whole.

5.3.2 Public health funding

In both hospitals, serious concerns remained with the limited public health funding from the government to the hospital, in line with the increasing public health activities. Public health funding has mainly gone to the township hospitals to implement the essential public health services. Financial losses from implementing the public health tasks in the hospitals was the most often heard complaint during my field visits. Facing the increasingly complex public health tasks from the government, the hospital had no choice but to accept and implement.

Despite the complaints, the resistant voice seemed to be less strong in Yongjia, perhaps due to receiving the routine annual funding of 800,000 Yuan for TB/public health. In particular, Dr. H1 (Head of the Public Health Department, Yongjia hospital) was quite optimistic about increasing the scope of public health tasks and saw this as an obligation

for the public hospitals:

'I think it is necessary for the government to increase more public health task for the hospital as our hospital has the first-hand information of the patients. The hospital serves the patients and people and the government must strengthen the public health of the hospital'.

In Cangnan, there was strong bureaucracy in promoting the public health implementation. The field visits and interviews suggested that the hospital was used to the situation of not receiving additional financial compensation for the increasing public health work. As the Health Bureau kept persuading and 'educating' the hospital staff with regular monitoring and evaluation, the hospital has become accustomed to undertaking the new public health work gradually. Dr A2 (Vice Director of Cangnan Health Bureau) strongly suggested that it was the hospital's responsibility to undertake more public health tasks, given their important and unique position to treat patients, especially with the recent development of the public hospitals:

'Many infectious disease control work can be started from the outpatient, for example measles. We also want the hospital to help us to detect and manage the chronic diseases... the hospital directors need to change their mind-set to give more attention to the public health work. Therefore, in the annual appraisal for the hospital, the public health scores have a high weighting based on the provincial requirement.'

5.3.3 Public health staffing

In Yongjia, only two staff were based in the public health department of the hospital. The head of the public health department was responsible for overall public health management while undertaking many other complicated infectious diseases (including TB) reporting tasks. Another staff member was responsible for women and children's health. Dr. H1 (Head of the Public Health Department) provided an apt metaphor, arguing they were just *'rowing a boat, and being a sailor and captain at the same time'*

In Cangnan, public health management work appeared to receive less priority than clinical work. The public health department was staffed with three people, who were perceived as not even meeting the official requirement, especially in line with the increased burden of public health. According to the official requirement, the public health department should be staffed with more than five staff if the hospital beds are more than 1000. Dr. J2 (Staff, Department of Public Health) complained that she was under great pressure:

'Indeed we have too much to do, you see the CDC has assigned increasingly heavy public health tasks for us... more and more... Still with these few staff... Tomorrow is Saturday, but I have to come here at 3pm as the statistical report is calculated until this time of tomorrow. So we almost do not have a break.'

Dr D2 (Vice director of Cangnan CDC) sympathised with the public health staff who were overburdened with the increasing public health work, which was however related to performance management by Health Bureau. On the other hand, he criticised the fact that the hospital put greater priority on the medical care, without investing more in public health. As a result, the public health staff were even reduced in some county hospitals.

5.4 Overview of the study hospitals

This section briefs the historical profiles of the two designated hospitals under study, and describes the hospital revenues generation, the financial performance and motivations in relation to TB treatment in the designated hospitals.

5.4.1 Historical profiles of the two hospitals

Yongjia hospital was established in 1931, and is the only general hospital at Grade Two (Secondary level), Class A in Yongjia. Cangnan hospital was relatively new, established in 1987 with stronger management and medical capacity than Yongjia. While Yongjia hospital vowed to upgrade to a Grade Three (Tertiary level) Class B hospital, Cangnan has achieved this for several years. Both hospitals paid great attention to strengthening

their capacity, through developing and introducing key specialists and advanced talents, although Cangnan has more departments/disciplines accredited as ‘key’ ones at, or above, the prefectural level. Both hospitals were keen to conduct management collaboration within and outside the prefectures. Cangnan hospital was even more proactive and has pioneered external collaboration exploration since 2004, and has established collaborative relationship with Taiwan’s Zhangji Hospital Group in 2012. Cangnan also ranked among the top hundred county hospitals in terms of comprehensive strength. In 2014, with support from the Zhangji hospital, Cangnan hospital passed the American Joint Commission International Accreditation, an international programme aiming to improve the quality procedures in the hospitals(Appendix 5.1). The accreditation appraisal has helped to improve the procedures, equipment, and quality of care in the hospital. I have witnessed the subsequent changes in the TB clinic during my field visits. For instance, there was no queue management system in the waiting area before. All the patients surrounded the doctor in the consultation room. Thanks to the international hospital application, the waiting area was refurbished with a new calling machine, so that patients no longer crowded in the consultation room, largely improving the consultation environment.

5.4.2 Hospital revenues, financial performance and motivations of TB treatment in the designated hospitals

Overall, the statistics suggested an increasing trend of the hospital service utilization in the two hospitals in terms of the number of hospital staff, outpatient, emergency visits, hospital beds, and patients discharged from the hospitals, although these indicators were poorer in Yongjia hospital following the service integration. The annual total hospital income, including the business income, increased year by year in both hospitals. However, this indicator was poorer in Yongjia hospital during the years from 2009-14. It is unclear whether this is related to the smaller population in Yongjia. The government investment as proportion of the total income in the hospitals remained limited and fluctuated throughout the years. In 2014, this proportion in Yongjia was 12%, much higher than that in Cangnan (5%). The TB clinic contributed very little to the overall business income of

the hospital. In Yongjia hospital, its TB income as a proportion of the business income increased gradually from 0.4% in 2009 to 0.8% in 2014, but this has remained at only 0.3% in Cangnan since 2011 (Table 5.1; 5.2).

Table 5.1 Basic information on the hospital performance in Yongjia

	2009	2010	2011	2012	2013	2014
No. of hospital staff	562	575	618	638	664	697
Including government quota (% of total staff)	462(82)	478(83)	522(84)	542(85)	564(85)	584(84)
Outpatient/emergency visits	180209	189876	225603	340021	458248	485715
Hospital beds	300	300	326	340	428	428
No. of patients discharged	10207	10380	10901	11656	13348	14640
Annual total income (10000 yuan),(1) including:	11014	14420	17852	18402	22084	25788
Government budget (10,000 Yuan)(2)(% of total income), including:	852(7.7)	2440(17)	3190(18)	996(5.4)	1039(4.7)	3089 (12)
Business income (10,000 Yuan)(3), including:	10062	11980	14662	17406	21045	22699
TB clinic income (10,000 Yuan) (% of business income)	43(0.4)	47(0.4)	92(0.6)	100(0.6)	205(0.96)	171(0.8)
Annual total expenditure (10,000 Yuan)	11056	14500	17907	18393	22072	25783

*(1)=(2)+(3)

Table 5.2 Basic information on the hospital performance in Cangnan

	2011	2012	2013	2014
No. of staff	948	1042	1105	1206
Staff within government quota (% of total staff)	712(75%)	774(74%)	839(76%)	911(76%)
Outpatient/emergency visits	495242	619175	683109	693773
Hospital beds	513	650	715	709
No. of patients discharged	20363	26138	28576	27618
Annual total income (10,000 Yuan)(1), including	26305.42	35585.01	42510.34	44873.43
Government budget (10,000 Yuan)(2) (% of total income) including	1386.72(5.3)	1005.56(2.8)	1697.48(4)	2241.70(5)
Business income (10,000 Yuan)(3), including	24782.04	34385.52	40657.46	42408.14
TB clinic income: (10,000 Yuan) (% of business income)	83.4504(0.3)	112.92(0.3)	121.4232(0.3)	134.7801(0.3)
Annual total expenditure (10,000 Yuan)	26266.45	35224.66	42699.41	45512.57

*(1)=(2)+(3)

As Chapter 3 indicates, hospitalization of TB patients is often used as the proxy indicator to understand the providers' financial incentives to treat TB in China. In both sites, most of the TB patients were newly registered TB patients, and the treatment success rate was up to 90% across the years (Table 5.3; 5.4). Overall, there was an increasing trend for admitting TB patients in both hospitals. In Yongjia, the proportion of TB patients who were hospitalised increased each year from 8.6% to 20% between 2009 and 2014; while the situation was even worse in Cangnan: hospitalisation rate of TB patients increased from 29% to 59% between 2011 and 2014. There was also increased length of stay (LoS) for TB inpatients in the designated hospitals. In Yongjia, the LoS increased by year from 11.35 to 17.5 days between 2009 and 2014; from 10.97 to 12.69 days between 2011 and 2014 in Cangnan. There were also increased medical costs for TB inpatients in both designated hospitals. In Yongjia, the average hospitalisation costs per patient increased by year from 5,069.77 to 9,368.02 Yuan between 2009 and 2014, while this was worse in Cangnan, from 7,278.63 to 11,065.89 Yuan between 2011 and 2014 (Table 5.3; 5.4).

Table 5.3 TB notification, treatment results and hospitalisation in Yongjia

	2009	2010	2011	2012	2013	2014
Number of TB patients	696	601	522	541	537	522
Newly registered patients (%)	619(89)	511(85)	477(91)	492(91)	506(94)	471(90)
Smear positive	241	230	190	180	188	163
Smear negative	378	281	287	312	318	308
Re-treated patients	77	90	45	49	31	51
Smear positive	36	50	32	36	16	31
Smear negative	41	40	13	13	15	20
Treatment success	604(87)	532(89)	475(91)	502(93)	479(89)	n/a
Number of patients hospitalised(% of total patients)	60(8.6)	57(9.5)	65(12)	82(15)	90(17)	105(20)
Length of stay	11.35	11.74	16.83	15.74	20.52	17.5
Average hospital costs per capita (RMB)	5069.77	6000.50	7067.85	6809.12	8428.02	9368.02

Table 5.4 TB notification, treatment results and hospitalisation in Cangnan

	2011	2012	2013	2014
Number of TB patients	699	653	613	534
Newly registered	609(87)	525(80)	485(79)	414(78)
Smear positive	228	193	177	145
Smear negative	381	332	308	269
Re-treated	67	77	78	77
Smear positive	27	24	37	26
Smear negative	40	53	41	51
Treatment success	659(94)	572(88)	532(85)	410(77)
Number of patients hospitalized(% of total patients)	203(29)	318(49)	299(49)	315(59)
Length of stay	10.97	11.90	11.65	12.69
Average hospital costs per capita (RMB)	7278.63	8764.36	9455.22	11065.89

The CDC staff tended to perceive the hospital providers as being profit-orientated. Financial incentives of the designated hospital and conflicts between income generation for the hospital and maintaining patients' interests emerged from the study. For instance, Dr. D1, Head of TB Control Department of the Yongjia CDC indicated the economic motivation of prescribing practices, while acknowledging the potential individual or geographical differences from other countries:

'These are just the excuses made by the doctors, as they can earn more from prescribing the liver protection drugs. In fact, clinical doctors are well aware of the cut-off level of liver transaminase. Doctors in the western counties usually do not prescribe liver protection drugs for TB patients whereas here liver protection drugs are commonly prescribed. It could be due to individual or geographical differences. So it is difficult to argue with them'.

According to Dr. H1, the public health director of the Yongjia hospital, the CDC staff had a long-standing concept and culture of not earning money from the patients. However, it is opposite for the hospital, where there is strong profit-making culture.

In Cangnan, the CDC and health officials also tended to attribute the overprescribing behavior to the economic incentives. As Dr. B2, Head of Disease Control of Cangnan Health Bureau commented: *'The hospital could make a profit when patients bought auxiliary drugs and liver protection drugs...Maybe it's related to hospital's intention. Staffs' salary and rewards are linked to performance assessments, which I think is negative.'* Dr F2, TB officer, Department of TB Control, Cangnan CDC added that, *'It is understandable that the hospital makes profits from the patients by making more prescriptions. But they should implement the free treatment policy. For the auxiliary drugs and examinations, the less, the better...'* This participant in particular commented on the problem of over hospitalisation of the TB patients in the designated hospital.

'Before TB service was integrated in the hospital, and still operated in the CDC, we do

not tend to suggest hospitalisation, as the concept is wrong. Even if they were admitted due to having serious comorbidities, they were discharged in 3-5 days and started the outpatient-based DOTS treatment soon...We had different perspectives, as we will consider patients' financial burden'

However, TB doctors in both hospitals did not agree that financial incentives and their personal incomes were related to their prescribing practices. As Dr L1 (TB doctor in the TB clinic, Yongjia hospital) said,

'The hospital does not give us the economic incentive and target. When the TB clinic was transferred from the CDC, we were made clear that TB clinic would prioritize social benefits, and the economic benefits came in the second place only. Only when necessary, we will prescribe CT.'

Dr. X2 (Head of Radiological Department, Cangnan hospital) added that, *'Before the medical reform, overtreatment was to earn money, but nowadays it is not really making money as prescriptions are not much related to the income of us doctors...'*

This section suggests that financial motivation is associated with the integrated service delivery of TB service in the designated hospital, as assumed from the beginning of the study. This problem will be further analysed in Chapter 7.

5.5 Conclusion

Integrated within public hospitals, TB services are being influenced by the on-going public hospital reform concerning drug policy, pricing and insurances, which aims to improve the 'public' nature of the hospitals and reduce the financial burden of the patients. Integration of TB services in the public hospitals has come across major resistance due to the perceived resource constraints in the hospitals. The resistance in Cangnan hospital appeared to be stronger, although there was a strong push from the health bureau. There were common challenges in implementing the public health activities in the hospitals,

including a weak tradition of public health, lack of funding and under staffing, in line with the increasing public health activities.

The government funding to the hospitals remains very limited. Yongjia hospital received better financial support from the government including the funding for TB; however, the use of this funding was unclear. TB clinics made little financial contribution to the hospitals, although the situation was a bit better in Yongjia. Financial incentives existed with the hospital TB providers, especially from the perspective of the CDC public health officials. Indeed, there was an increasing trend for admitting TB patients, with increased length of stay and hospitalisation costs in both hospitals, although the hospitalisation rate and costs in Cangnan were much higher. However, as discussed in Chapter 1, in addition to the financial incentives, integration is also associated with the change of the organisational culture, resources and working relationships. From the next chapter, I will explore how these health systems components and processes will influence the prescribing behavior of the TB doctors in the designated hospitals.

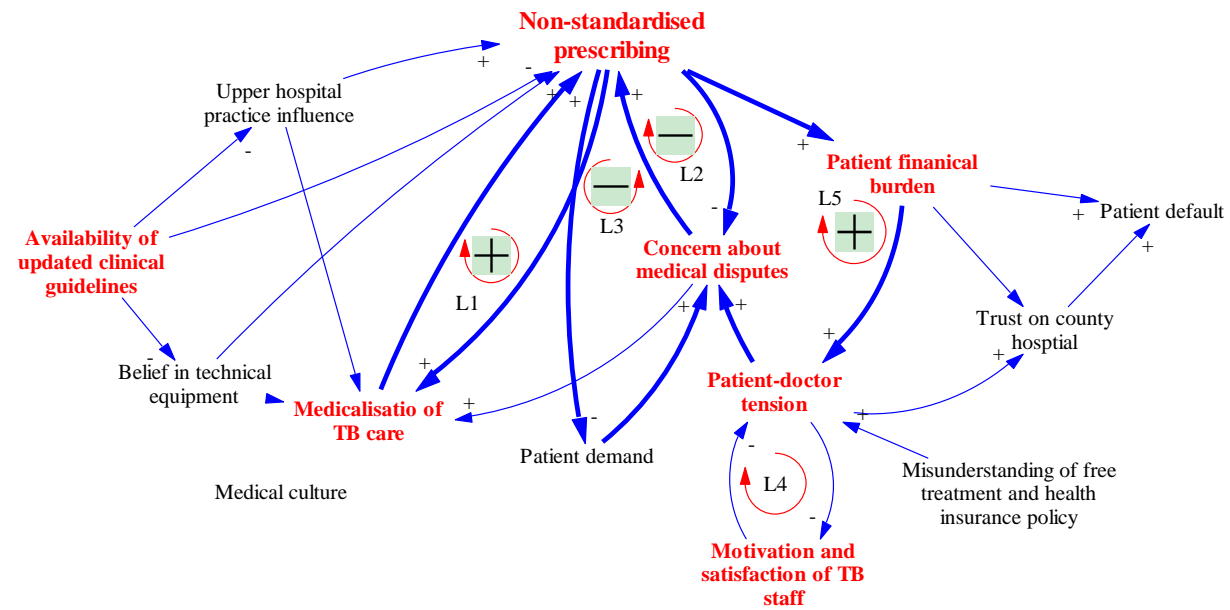
Chapter 6 Medicalisation of TB care in the designated hospitals: extent, rationales and implications of non-free, non-standardised prescriptions

In Chapter 3, I presented the empirical evidence pointing to TB health providers' poor adherence to the national guidelines in China, as indicated by widespread prescription of non-free, non-recommended hospital admissions, laboratory services, and high-tech examinations in the designated hospitals. However, ambivalence to guidelines is under-explained in the current literature. Integration of TB service from the CDC to the hospital may indicate the change in professional culture and practice of health providers.

In this chapter, through an analysis of non-free and non-standardised prescribing behavior, I argue that TB care is progressively medicalized in designated hospitals. I examine the changing context of care as it influences the non-standardised providers' prescribing behaviour. Finally, I examine the perceived consequences of TB doctors' prescribing practices on the patients' financial burden and case management.

The diagram (Figure 6.1) reflects the strongly emerging theme of 'medical culture' and illustrates the dynamics among the factors related to the phenomenon of medicalisation of TB care in the designated hospitals. These factors include, for instance, availability of auxiliary treatment guidelines, patient demand of care, doctor-patient tension and financial burden of TB patients. The diagram shows how these dynamics have contributed to the non-standardised prescribing behaviour of the TB doctors in the designated hospitals.

Figure 6.1 Causal loop diagram for medicalisation of TB care in the designated hospital



6.1 Medicalisation of TB care: extent and rationales for non-free, non-standardised prescribing

In order to understand the extent of non-free and non-standardised prescribing of the TB doctors in the two hospitals under study, this study reviewed the medical records of the newly registered, uncomplicated TB cases. As illustrated in Chapter 5, uncomplicated cases refer to newly registered patients without records of drug resistance to any anti-TB drugs or any serious co-morbidity such as HIV, diabetes, cardiovascular disease, or hepatitis. The purpose of such recruitment was to ensure the comparability of TB treatment against the guidelines to reduce the ‘case-mix’ problem.

6.1.1 Profile of health and health care seeking among study participants

In Yongjia, 171 patient charts of uncomplicated cases were included for analysis, including 60 (35%) for smear positive patients and 111 (65%) for smear negative patients. In Cangnan, 169 patient charts were included for analysis, including 61 (36%) for smear positive patients and 108 (64%) for smear negative patients. Most of the patients were male (67% in Yongjia; 62% in Cangnan). The average age of all participants was 40 (SD: 14) and 36 (SD: 14) in Yongjia and Cangnan respectively. Of these patients, 51 (30%) and 29 (17%) were internal migrants in Yongjia and Cangnan respectively.

The focus of this thesis is the prescribing behaviour of TB doctors in the context of integrated service delivery in the designated hospitals. However, understanding the health care seeking experience of the TB patients, e.g., first contact of health services, patient delay²², and provider delay²³ will provide a broader picture of the TB control in the integrated model. Upon the onset of TB symptoms, 38% and 84% of the TB patients in Yongjia and Cangnan first approached the non-TB clinics, e.g. general outpatient, respiratory department, internal medicine of the designated hospital. Only 24% and 10% of the TB patients first approached the TB clinics of the designated hospitals, in Yongjia and Cangnan respectively. The average patient delay is 45(SD:

²² Patient delay is defined as the time interval between onset of TB symptoms and the first consultation of a health facility.

²³ Provider delay describes the intervals between the first consultation at a health facility and consultation at the TB clinic of the designated hospital.

113) and 43(SD: 149) days in Yongjia and Cangnan, with 51(29%) and 61(36%) having patient delay ≥ 14 days in Yongjia and Cangnan, respectively. The average provider delay was 11(SD: 53) and 19(SD: 61) days in Yongjia and Cangnan respectively, and 33(19 %) and 33(20%) had provider delay ≥ 14 days. The average treatment duration is 6.7(SD: 1.6) and 8.1(SD: 2.4) months respectively. Regarding the treatment outcome, 76% and 100% of the study participants completed the treatment respectively. In both sites, no significant difference was observed between smear positive and negative cases regarding the gender, age, migration status, first contact of health services, treatment duration and treatment completion. In Cangnan, the smear positive patients had significantly longer delay (42 days vs 32 days, $P=0.008$) and higher proportion of patients with patient delay ≥ 14 days (52% vs 27%, $P=0.008$) than smear negative patients (Table 1).

This section suggests that very few TB patients directly visit the TB clinics of the designated hospitals as their first contact for health services. Patient delay and health systems delay remained high in both sites, and smear positive TB patients tend to have longer and higher proportion of patient delay ≥ 14 days. As suggested in the Chapter 3, this may have financial implications for the TB treatment.

Table 6.1 General and health care seeking characteristics of the study participants

Demographic group	Yongjia			Cangnan		
	Total	Smear +	Smear -	Total	Smear +	Smear -
	171	60(35)	111(65)	169	61(36)	108(64)
Male (%)	114 (67)	38(63)	76(68)	105 (62)	33(51)	72(67)
Age ($\bar{x} \pm s$)	40(14)	41(13)	39(14)	36(14)	39(15)	35(14)
Internal migrants (%)	51 (30)	21(35)	30(27)	29 (17)	9(16)	20(19)
First contact of health service						
Village clinics (%)	6 (3.5)	6(10)	0	1 (0.6)	1(1.6)	0
Township hospitals (%)	22(13)	8(13)	14(13)	8(4.8)	3(4.9)	5(4.6)
County hospital (%)	35(20)	11(18)	24(22)	1 (0.6)	1(1.6)	0
Non-TB clinics of county Hospitals (%)	64(38)	21(35)	43(39)	141 (84)	46(75)	95(88)
TB clinics of county hospital (%)	41(24)	13(22)	28(25)	17 (10)	10(16)	7(6.5)
Treatment duration(months) ($\bar{x} \pm s$)	6.7(1.6)	6. 6(1.5)	6.6(1.7)	8.1(2.4)	8.2(2.5)	8.1(2.4)
Treatment completion (%)	130 (76)	43(33)	87(67)	169(100)	61(36)	108(64)

Patient delay(days) ($\bar{x} \pm s$)	45(113)	55(128)	40(105)	43(149)	42(79) ^a	32(118)
≥ 14 days (N, %)	51(29)	20(33)	31(28)	61(36)	32(52) ^b	29(27)
Provider delay(days) ($\bar{x} \pm s$)	11(53)	14(51)	8.9(54)	19(61)	19(71)	19(59)
≥ 14 days (N, %)	33(19)	11(18)	22(20)	33(20)	10(16)	23(21)

Smear positive significantly higher than smear negative in Cangnan: ^a(U-test P=0.008), ^b($\chi^2=11.163$, P=0.001)

6.1.2 Prescription of non-free, non-standardised medical examinations

In Yongjia, 65% of the uncomplicated TB patients are prescribed with a CT as compared to 89% in Cangnan (Table 2). A CT examination costs RMB 200, as compared to the free X-ray as recommended by the guidelines. Despite the higher cost, the interviews with TB and radiological doctors highly valued the use of CT in diagnosing the TB due to its clearer imaging as compared to the X-ray. In Cangnan, similarly interviews with TB and radiological doctors claimed that the CT could help to detect the damaged organs and holes more accurately than the X-ray. Dr. X2 (Head of Radiological Department, Cangnan hospital) perceived CT to be better than the pathology test as the CT could help to detect whether there was a problem and what the problem was. He explained that when they used the X-ray in the past, they even had to guess whether a shadow in the lung was due to TB or not, since TB might be hidden by the heart at the early stage. The CT was also perceived to have additional benefits to diagnose other associated symptoms or diseases, especially for the TB patients with longer history. Dr. X2 shared an example of using the CT to detect the lung cancer from a smear positive patient:

'Last October, we diagnosed a smear positive patient who brought CT slides and other reports to our clinic. There was only a shadow from the slide and can be confidently diagnosed as smear positive TB. In two months, he developed into lung cancer. If I did not prescribe CT, we would not find lung cancer.'

However, in both sites, the TB doctors argued they did not prescribe the CT for all TB patients. The interviews in Yongjia suggested that the CT was only prescribed when the conditions of the patient were serious, or when the focus point of infection (TB pattern) was not clear enough to be detected by the X-ray. In Yongjia, TB doctors also tended to recommend smear positive TB patients using CT, as showed by the quantitative result that 78% vs. 58% of the smear positive and negative patients were prescribed for the CT. In Cangnan, Dr. M2 (TB clinic doctor, Cangnan) emphasized that they did not prescribe CT for all cases, but selectively and mainly for TB patients at the early stage when the diagnosis was not easy to be confirmed. She emphasized that the decision regarding whether to accept the CT examination or X-ray always

remained at the hands of patients, and doctors would also make it clear that the X-ray was free but the CT was chargeable.

In both sites, the CDC officials agreed that doctors used CT to improve the quality of diagnosis to protect themselves in the changing context of care in line with the poor doctor-patient relationship and increasing medical disputes. However, they maintained that it was not necessarily the case that the CT would improve the quality of care. Dr. D1 (Head of TB Control Department, Yongjia CDC) argued that, despite the wide use of the CT, misdiagnosis of TB or other diseases still occurred, reducing patients' trust in the designated hospital. He shared an example of misdiagnosing lung cancer as TB:

'Despite the CT is used more than before, there are more misdiagnoses occurring between our two TB doctors. It happened in the TB clinic that anti-TB treatment was applied to patients with lung cancers. When the patient went to Wenzhou prefectural hospital, he was subsequently diagnosed with a lung cancer. As a result, fewer and fewer patients come to visit our TB clinic here year by year, as they lost trust in the designated hospital'.

In Cangnan, Dr. F2 (TB officer, Cangnan CDC) was even more sceptical about using CT as a diagnostic tool for TB, hinting at the hidden agenda among TB doctors in the designated hospital.

'I felt our doctors (when still in the TB dispensary of the CDC) were not better than the TB doctors in the hospital. But why we can see the TB in the lung clearly using X-ray? Anyway, there is very high proportion of CT use. It must be influenced by other factors.'

The fact that the CT was widely used was also due to the medical environment and practices of the general hospitals. It was indicated that use of the CT was no longer driven by the financial incentives as indicated in the Chapter 5, but by the technological changes that would help to improve the treatment and patient satisfaction. As Dr. H1 (Director of Public Health Department, Yongjia hospital) reflected,

'The CDC has reflected to us that auxiliary drugs and examinations were over used. But I do not think it is only the problem of the TB clinic, but the whole hospital has a culture of prescribing CT. In fact, DR is also very clear, but the doctors think the CT must provide clearer images. I think doctors are too dependent on the modern and advanced equipment and it is a matter of value judgment.'

In Cangnan, there was a strong voice to replace the X-ray with the CT for the routine TB examination. It was criticised that the current TB control policy was outdated, which failed to adopt a modern and efficient diagnostic tool such as CT. As Dr. Q2 (Head of Infectious Disease Control Department, Cangnan hospital) explained,

'We advocate the use of CT as the X-ray is not even clearer for the small symptoms. Before, the CDC said the free X-ray should achieve the detection of a certain number of TB cases. However, many patients do not have clear X-ray results and so they use the CT. In this case, X-ray is still required by the TB policy. Can the public health policy loosen this requirement? Since patients have used CT, what is the point of doing further X-ray to achieve the programme target? I think this is not appropriate...before, CT is not common, but nowadays CT is getting more and common.'

Table 6.2 Prescription of non-free examinations, drugs and hospital admissions for the uncomplicated TB patients in the designated hospitals

Interventions	Yongjia			Cangnan		
	Total	Smear +	Smear -	Total	Smear +	Smear -
	171	60(35)	111(65)	169	61(36)	108(64)
CT (N, %)	112(65)	47(78)	65(58)	150 (89)	55(90)	95(88)
First line anti-TB drugs (N, %)	29 (17)	23 (38) ^a	6(5.4)	26 (16)	11(18)	15(14)
Second-line anti-TB drugs (N, %)	1 (0.6)	1(1.7)	0	2 (1.1)	1(1.6)	1(0.9)
Liver protection drugs (N, %)	60(35)	29(48) ^b	31(28)	120 (71)	49(80)	71(66)
Immune system improvement drugs (N, %)	153 (90)	58(97)	95(86)	57 (33)	20(33)	37(34)
Hospitalised (N, %)	2 (1.2)	1 (1.7)	1 (0.9)	15(8.9)	5 (8.2)	10 (9.3)

Smear positive significantly higher than smear negative within Yongjia: ^a($\chi^2=29.986$, $p<0.001$)

Smear positive significantly higher than smear negative within Yongjia: ^b($\chi^2=7.120$, $p=0.008$)

6.1.3 Prescription of non-free, non-standardised drugs

In both sites, interviews of the hospital providers suggested a common recognition that liver protection drugs should be used to prevent the liver damage, drug hepatitis, and disruptive hepatitis caused by the anti-TB drugs, to avoid the potential medical disputes. However, compared to the TB clinic in Cangnan hospital, the TB clinic in Yongjia hospital had fewer prescriptions of liver drugs: only 35% patients were prescribed with liver protection drugs as compared to 71% in Cangnan (Table 6.2). Accordingly, there was less emphasis on the liver damage by the TB drugs in the interviews conducted in Yongjia.

In Cangnan, both TB and public health doctors in the hospital had strong opinions that liver drugs should be prescribed for preventive purposes. Despite awareness of the guidelines, they argued that long-term medication of TB drugs would seriously damage liver function. They maintained that TB treatment should not be discontinued just because of the increased Alanine transaminase, and liver protection drugs should be used on a continuous basis to prevent liver damage effectively. As Dr. M1 (TB doctor, TB Clinic, Cangnan hospital) argued,

'You said you have a good liver function and no need to take liver drugs. But who can guarantee? Before we check the liver function once every 1.5 months. But sometimes Alanine transaminase can be increased in one day. I had a patient whose Alanine transaminase was up to 1000 only after taking TB drugs for one month.'

While Dr. J2, the Public Health Doctor in Cangnan hospital acknowledged her professional limitation as a public health doctor, she also tended to support the clinical prescribing for preventing the side effects.

'Because TB drugs have big damage on the liver and kidney functions, especially with longer-term impact so I think the liver functions need to be closely checked...It is possible that doctors have their own consideration. I am not professional in this field but I think any drugs have side effects. If this drug has serious damage on the liver and kidney function or there is contraindication specification, I think it can be prescribed.'

For example, rifampin has serious damage on the liver function, and then I think liver drugs should be given at the same time.'

Use of immune systems improvement drugs

Although the liver protection drugs were used less in Yongjia, the use of immune systems improvement drugs in Yongjia was much higher than that in Cangnan (90% vs. 33%) (Table 6.2). However, there were inconsistent attitudes regarding the necessity of using these drugs due to the uncertain effect of these drugs. As Dr. L1 (TB clinic doctor, Yongjia hospital) argued:

'It is necessary to use the immune improvement drugs for the patients with poor immunity. After all, TB is due to the decreased immunity. The effect of immune improvement drugs is good, so it is necessary. If patients can afford, we will prescribe.'

However, Dr. P1 (Doctor, Infectious Control Department, Yongjia hospital) was sceptical about this, *'Honestly speaking, whether this drug (immune improvement drug) is effective or not, I am doubtful.'*

Prescribing of non-free first-line anti-TB drugs

As per guidelines, the programme recommended 'Fix-Dose Combination' (including the four TB drugs) as the first-line regimen as part of the free treatment policy. However, in Yongjia and Cangnan, 29 (17%) and 26 (16%) patients were prescribed with first-line, non-free individual anti-TB drugs (non-FDC drugs) (Table 6.2). In both sites, there was a general perception that the non-free, individual TB drugs were of better quality than the FDC. In Yongjia, Dr. O1 (Head of Infectious Disease Control Department of the hospital) explained that he felt disappointed about the quality of Chinese drugs. Dr. U1 (TB Pharmacist, Yongjia hospital) agreed that non-free individual TB drugs and the free FDC drugs should be of a different quality, as the latter did not have enough chemical power, since four TB drugs were simply pulled together.

'The chemical power of fixed-dose combination must not be sufficient as they put four

drugs into one capsule. So it is a big capsule but the power must not be sufficient. I also heard the doctors said the power was not sufficient. From the beginning when I saw it, I doubted the adequacy of the combined drugs. We had free individual bottled drugs before, but don't know why it is not available now. I don't know why.'

In Cangnan, Dr. G2 (Vice-Director of the hospital) complained that quality of the free FDC was poor due to the 'rough' manufacturing processes and 'inappropriate' dosing of different components. This was perceived to have caused side effects such as transaminase elevation of many patients, which contributed to the wider use of auxiliary drugs, such as liver protection drugs. Dr. G1 (TB doctor, TB Clinic) argued that the FDC TB drugs were contra-indicated for certain diseases. She manifested patients' perception of free TB drugs as being of 'poor quality'. She expounded on the benefits of replacing the free FDC drugs with non-free individual drugs on reducing the size effects.

'You see some TB patients use free TB drugs initially. But if they are patients with a certain disease, e.g. mental illness, they should not be prescribed with free TB drugs. As well, some TB patients do not want us to prescribe free drugs and we tell them free drugs do not mean poor quality of treatment but some do get allergic upon using free drugs. When it is changed to non-free TB drugs, the allergy stops'.

The CDC staff in both sites also agreed that using non-free non-FDC drugs might achieve better outcomes of TB treatment. In contrast with the perception that FDC did not provide enough dosages in Yongjia, Dr. D2 (Vice Director, Cangnan CDC) suggested that the FDC drugs were actually 'over-dosed', and so not suitable for the TB patients in the study area:

'For patients who are prescribed with the 'individual TB drugs', based on my personal understanding, the main reason is the side effects of the fixed-dose combination due to the overdoses of the combination drugs. It is not designed according to us 'southerners' [Chinese people living in south of the Yangzi/Changjiang River], but the northerners.

The northerners may tolerate the dosages, which are too big for us southerners based on our weight [normally northerners have ‘bigger’ shape than southerners].’

6.1.4 Prescription of hospital admissions

In Yongjia, the hospitalisation rate of the uncomplicated TB cases was lower than that in Cangnan (1.2% vs. 8.9%) (Table 6.2). This pattern is also consistent with the pattern for the hospitalisation rate of all cases: Cangnan hospital had much higher admission rate than that in Yongjia (20% vs. 59%), as reported in Chapter 5. In Yongjia, there were strict criteria for admission of TB patients. The interviewees emphasised that only serious patients with obvious complications of pleural effusion, MDR, coughing blood and other diseases, and older patients, would be admitted for hospitalisation, normally for less than a month. The hospitalisation was also restricted due to limited availability of hospital beds, with only 12 out of 40 beds allocated for TB. In addition, the fact that the TB clinic was not part of the Infectious Control Department, which hosted the TB wards, may also have contributed to the restricted admission of the TB patients. It seemed that admitting TB patients was not the major interest of the infectious disease control department. Dr. O1 (Head, Infectious Disease Control Department, Yongjia hospital) stressed that even self-isolation under the outpatient-based DOTS treatment in the TB clinic would help to control the spread of the disease. Admitting TB patients did not necessarily help to control the spread of the TB, due to the poor isolation conditions of the wards and poor adherence to the infection control of the patients. This caused the concern of infectious disease control within the hospital. As Dr O1 further explained,

‘The problem is that smear positive patients are dispersed here and there. Even if you admit them, they will still walk out of the wards. Therefore, it is difficult to manage and control infection and spread of TB. Very difficult, hence more and more TB patients; more and more difficult to treat.’

In Cangnan, there was a stronger tendency to admit TB patients among hospital providers. In addition to the clinical considerations, reducing the transmission of smear positive TB in the community was an important reason to admit TB patients. Dr. M2

(TB doctor, TB clinic, Cangnan hospital) shared a story of communicating with a smear positive TB patient, where she showed great concern on the potential transmission of TB using the outpatient treatment strategy:

'We say smear positive patients should be isolated at home, but it is not possible. I saw a smear positive patient. He is a business motorcycle driver²⁴ [to carry passengers], I suggested to him not to work and to have a rest at home. You say how many people would be infected by him (by taking other people) if he kept working. He did not agree, and rode his motorcycle to renew drugs. Just can't persuade him. Some patients are better educated and more sensible, if you tell them TB is infectious disease, you must be isolated at home, they would accept our suggestion. But who knows if they are really isolated at home. In this case, how can TB be controlled? Smear positive TB is the source of infection and one positive patient would infect at least 10-15 people.'

While TB doctors emphasised that whether or not a patient was admitted also depended on the full communications with TB patients, Dr. J2, public health doctor of the hospital, regarded it as rational to admit smear positive patients who agreed to be admitted.

The study revealed the outdated knowledge of case management of the TB doctors. In the training workshops organized by higher level CDCs, Dr M2 (TB doctor, TB Clinic) often communicated with doctors from other hospitals, and challenged the current policy and practice that smear positive patients were not admitted for hospitalisation. Dr. N2 from the infectious disease control department seemed to be impressed with the previous guidelines, which required the smear positive patients to be admitted. In fact, since DOTS implementation in 1990s, TB treatment has become mainly outpatient based. Under the DOTS strategy, even the smear positive patients are not recommended for hospitalisation unless they have serious comorbidities. However, TB doctors were not up-to-date, or at least not familiar with this significant treatment policy change. As Dr. N2, TB doctor, Infectious Disease Control Department, Cangnan hospital reflected, *'As far as I know, the guideline says smear-positive*

²⁴ In the poorer counties, motorcycle services are popularly used to carry the passengers.

patients should be hospitalized. When we went for meetings before, they said in other countries, smear positive patients should be put into hospital, but we did not practise like this.'

Although the interviews suggested that second-line anti-TB drugs are popular among the two TB clinics, the medical chart review only found that a few patients were prescribed with second-line anti-TB drugs: one patient 1 (0.6%) in Yongjia and two (1.1%) in Cangnan (Chapter 6, Table 6.1). This could be due to the strict selection criteria for the uncomplicated TB cases, while the interview may have broadly referred to all TB cases. It is interesting to note that in Cangnan, the prescribing pattern between smear positive and negative patients tended to be similar in terms of CT examination, immune improvement drugs, first-line individual anti-TB drugs and hospital admissions. However, in Yongjia, smear positive patients tended to be prescribed with these treatment interventions as compared to the smear negative patients. In particular, a significantly higher proportion of smear positive patients were prescribed with the first-line anti-TB individual drugs than smear negative patients (38% vs. 5.4%, $p < 0.001$). In both sites, there was a tendency that more smear positive patients were prescribed with liver protection drugs than smear negative patients, and a statistical difference was detected in Yongjia (48% vs 28%, $P = 0.024$). TB doctors may perceive that smear positive patients should receive more auxiliary treatment, given the severity of the disease, as compared to the smear negative patients. However, further research is needed to explain why Yongjia tended to have this pattern while Cangnan did not.

6.1.5 Availability of technical guidelines for auxiliary treatment

Lack of clear guidelines on the auxiliary treatment remained an important barrier for the TB doctors to practise rationally on the evidence base. There was technical guideline on the rational use of antibiotics, but not for that of the auxiliary drugs and examinations. Any use of auxiliary drugs would depend on the doctors' knowledge and experience, causing universally common prescribing of non-free, non-standardised drugs and examinations. Dr. D1 (Head of TB Control, Yongjia CDC) was concerned that, *'Treatment in TB in foreign countries only costs about ten dollars whereas in China it costs several thousand yuan. I think it is mainly because our*

country does not have corresponding guidelines for axillary treatment and drugs prescribed by doctors of general hospitals.'

Interviews in Cangnan also suggested the unavailability of, or lack of clarity in, relevant technical guidelines regarding prescription of auxiliary drugs and examinations. Dr. G2 (Vice Director, Cangnan hospital) suggested,

'...also with what you mention about the drugs, when to use them, for example, in what circumstances of liver function level, can the liver drugs be used? It must be clear as doctors concern about the potential medical disputes. This is also true with CT...' Dr. J2 (Public health doctor, Cangnan hospital) added that, *'Moreover, we should have a clearer standard for using auxiliary drugs and CT in the future.'*

The lack of guidelines for auxiliary treatment also caused confusion in terminology. The health authority and CDC public health officials tend to refer to the treatment beyond the guideline recommendations as 'auxiliary treatment'. This term is commonly used in different occasions such as technical and supervision meetings. Dr. K1 (Head of TB Clinic, Yongjia hospital) questioned the appropriateness of using the term 'auxiliary' to cover the non-guideline recommended drugs. Instead, some of these 'auxiliary' drugs were perceived to be essential for some patients, with value for money in the end.

'Whether or not 'Auxiliary' drugs is needed depends on the patients' conditions. It is not the case that all the drugs are 'auxiliary'. In fact, some of these drugs are essential. Like immune system improvement drugs, patients with poor health conditions must be given. It is good for patients. You try to save some money for them (during the treatment), but if TB cannot be cured, it is not useful in the end'.

The national TB guidelines followed the international guidelines, the perceived credibility of which remained controversial due to the perceived lack of evidence when applied to the local settings. Dr. K1 suggested that the health conditions of the Chinese people warranted the use of auxiliary drugs to protect their health.

'WHO's guideline is not necessarily evidence-based. The health conditions of the Asian people would be similar among them, but different from the African people. The fundamental reason of getting TB is that your health fails, immune ability declines, and so you are infected with TB. If you have good health quality, it is difficult to be infected. If my health quality is not good, how can I sit here to treat TB? Given the physiological health conditions of Chinese people, they should use the liver protection drugs routinely; otherwise, the liver functions of some patients will not be tolerant'.

Although there were stronger views on the definitions of auxiliary treatment in Yongjia, prescription of the most common two auxiliary treatment interventions, i.e. liver protection drugs and CT was not necessarily higher than that in Cangnan.

Without clearer guidelines on the auxiliary treatment, TB prescribing practices are vulnerable to the influence of the practices in other hospitals, especially the higher-level hospitals. According to the interview with the hospital providers, prescription of CT, auxiliary drugs, and admission of TB patients was very common in the hospital sector, especially in the hospitals at the higher levels. TB doctors at the county level argued that they should follow the treatment interventions the TB patients have received elsewhere. This helps to maintain the similar quality of treatment to ensure the continuity of care of the TB patients. For instance, in Yongjia, the TB doctor suggested that many TB patients were referred from other hospitals with the results of CT examination. In this case, the CT examination was deemed necessary for the patients who visited the TB clinic for diagnosis, rechecking or drug renewal, to ensure the consistent evaluation before and after treatment in the TB clinic. In Cangnan, Dr. D2, Vice Director, Cangnan CDC illustrated an example of the influence of the higher-level hospitals on hospitalizing TB patients.

'I have once seen one complaint from TB patient. He requested to be hospitalised but failed to be admitted. Doctors from Wenzhou prefectural hospital suggested him being hospitalised. But we explained to the patient, if you do not need to be hospitalised based on your condition, the hospital would not admit you for sure. In addition, if you

need to be hospitalised indeed, if they do not have beds available, they cannot admit you either.

This case suggests that, TB patients who are diagnosed or treated at the higher-level hospitals, would also expect to receive similar quality of care in the county designated hospitals. This actually caused potential conflict between the county designated hospital and TB patients.

However, TB doctors in both hospitals reflected that their prescriptions of auxiliary drugs were already quite modest as compared to other hospitals, especially those at higher levels. As Dr K1, Head of TB clinic, Yongjia hospital commented, *'Here, we are already much better than Shanghai. In Shanghai, the hospital doctors prescribe much more liver drugs than us. Our CDC does not come to supervise us a lot, as we do not prescribe a lot of these drugs nowadays.'* Dr. M2, TB clinic doctor, Cangnan hospital added that,

'Nowadays liver drugs are universally prescribed. We know because we have communications with other hospitals. Liver protection drugs are most often prescribed. Actually we are better as we are the lower level hospital and we would use the liver protection drugs with poorer quality [meaning 'cheaper']. The liver protection drugs with better brands will be used in the upper level hospitals. Those patients who see doctors from Shanghai and Hangzhou often bring with them imported liver protection drugs.'

These remarks further reflect that, due to the lack of clearer guidelines on auxiliary treatment of TB, health providers have used the practices of other hospitals especially those at the higher levels as the 'reference'.

This section suggests that integration of TB service within the hospital has contributed to the medicalisation of a public health problem by the hospital-based doctors. This is due to the deep-seated medicalised 'mental models' of the medical doctors, who often base their clinical decisions on individualised medical conditions, rather than the

population perspective held by the public health professionals. Clinicians in the hospitals strive to maintain professional status in the face of integrating a public health problem within a hospital setting. Strong medical rationales were given to support the prescribing of the non-free, non-guideline recommended drugs and examinations. However, the non-standardised prescribing behaviour will in return enhance the medicalisation of TB care, constituting a positive feedback loop (Figure 6.1, L1). Without clear guidelines on auxiliary treatment, TB doctors self-organise, to adapt to the common culture and norms of prescribing auxiliary treatment for TB among their counterparts in other hospitals, with peer influence and an associated belief in the authority in advanced technology. TB doctors implicitly question the evidence base on which Chinese TB treatment guidelines rest. Their adaptations to the health situation of the local patients may help to explain non-standardised practice in TB care.

The prescribing of non-free, non-guideline recommended drugs, medical tests and examinations was common in both sites. This study suggests inconsistent prescribing patterns between the two hospitals. For example, a lower proportion of patients in Yongjia were prescribed CT (65% vs. 89%), liver protection drugs (35% vs. 71%), hospitalisation (1.2% vs. 8.9%); but higher proportion of patients were prescribed immune improvement drugs (90% vs. 33%). These results suggest that Yongjia hospital may perform better in some auxiliary treatment indicators, such as use of CT, liver drugs and admissions, but not in others. On the other hand, the TB clinic may become more medicalised to provide over treatment when integrated as part of the clinical department in the hospital; but less so, to remain as an independent unit with less influence from the medical culture.

6.2 Prescribing against the changing context of care

As described in Chapter 1, in China, there has been escalating tension and crisis between doctors and patients. Such lacks of understanding and trust, and loyalty in the patient-doctor relationship are often attributed to the malpractice, rising costs, and conflict of interest between patients and medical professionals in the context of marketised health services. Excessive prescribing of non-free and non-standardised treatment does not only reflect the medical values embedded within the hospital

providers; but may also be a self-protection mechanism to avoid potential medical disputes in the context of poor doctor-patient relationships. Tension and mistrust between the patients and doctors were also evident in the TB clinics of the two hospitals, although these were less apparent in Yongjia.

During the fieldwork in Yongjia, I found a few complimentary red flags hung on the TB doctors' office, which showed patients' gratitude for doctors curing their TB. Dr. D1, Head of TB Control Department, Yongjia CDC reflected in the recent years the doctors' service attitude has improved, although the treatment cost remained high for TB patients. In general, patients trusted TB doctors and patients were satisfied with the doctors' attitude. However, Dr. I1, Head of Medical Affairs Department, Yongjia hospital, suggested that doctors and patients had poor trust in each other in general, and that the TB clinic was not necessarily better than other clinical departments in this respect. Dr. H1, Director of Public Health Department, Yongjia hospital, suggested that there were only one or two medical complaints from the TB patients in the recent year. She shared a recent story of medical complaint. A child TB patient was prescribed some drugs by a TB doctor, but the prescription script was rejected by the TB pharmacist. The TB pharmacist thought that the drug was not suitable for this young patient based on the TB guideline. However, the pharmacist did not communicate with the TB doctor who prescribed this drug, before declining to distribute this drug to the patient. The patient's parents thus complained about the poor attitude of the TB clinic staff. This small story showed how poor communication among the TB staffs could cause medical complaints.

In Cangnan, the medical environment and doctor-patient relationship seemed worse than in Yongjia. During my fieldwork in the TB clinic, I came across a quarrel between the TB doctor and a patient. The TB doctor (Dr. M2, TB clinic, Cangnan hospital) spoke loudly and almost lost her temper. Explaining the story to me, she complained about the 'rude' attitude of the TB patient and the challenges of working with poor patients:

I don't want to say they are a pain in the neck, but some patients are really like this.

It is our fault if the doctor is not right, or if we did not explain things rightly. But I did explain things, and they insist you did not explain. One day, a patient paid the money and he got the receipt of sputum test. Today, he brought the sputum sample with him, but complained I did not give him a receipt (to be presented to the laboratory). In fact, the receipt is just in his hand. You can't imagine how annoyed I am!'

She further revealed her unhappiness in working with TB patients, *'The TB patients often have poorer conditions. They can't understand you at all. In most cases, you are kind to them but they do not feel you are kind to them. So it is very hard to work with TB patients. Nobody wants to work with infectious disease patients.'*

Dr. M2's narratives reflect the poor communication and trust between the TB doctor and TB patients, especially the poorer patients. Poor doctor-patient trust was not only evident in routine TB clinical practices, but also in other aspects of TB control. The public health and radiological doctors complained about the challenges of recording essential information from the TB patients, which have caused further conflicts. These episodes not only suggested the lack of patient information management system, but also the social stigma of TB, which contributed to the potential conflicts between the TB patients and health workers. As Dr. J2 (Staff, Public Health Department, Cangnan hospital) reflected:

'Sometimes patients are not honest, you ask them about where they live. They ask back 'why do you ask these questions'? 'Are you coming to check our household registration status?' 'The doctor has asked me already, why you want to ask me again? They would not tell you, at most they tell you the name of the road (but not the room number). If you ask a few more questions, they would quarrel with you. So I feel sometimes patients are difficult to communicate with.'

TB treatment was intended to be provided free, but in reality incurred high medical costs for patients. This problem often conflicted with patients' original expectations of receiving free TB care. On the one hand, patients had to pay for the non-free, non-guideline recommended auxiliary drugs and examinations through health insurance

schemes and out-of-pocket payment. As Dr. M1, Nursing staff, TB clinic, Yongjia hospital reflected, *'Some patients complained that TB care was free but why they were charged for money. Then they ran away from the hospital. Last time a patient come to me, and ask how much, then became very angry: are drugs not free?!'* Dr D2, Vice Director, Cangnan CDC shared similar concern, *'When the patients go to the hospital and are asked to pay 1000-2000 yuan, they become very angry; they would roar out, you said TB was treated for free but why I spent so much...'*

On the other hand, only confirmed TB cases could receive free basic care; while presumptive TB cases who came for examination but were not confirmed as TB, were not eligible for the free treatment policy. As Dr. J2 (public health doctor, Cangnan hospital) reflected,

'Indeed some TB suspects have cough, cold and fever, and sometimes coughed for a long time, but care for this is not free. But if they are not diagnosed as having TB they just cannot accept it (not being free). He would say, oh, I spend so much money but why not TB! Therefore, this is how doctor-patient relationship is getting worse...'

Potential disputes could also arise from the misunderstanding of the health insurance policy, which only allowed confirmed TB cases to be reimbursed. In order to avoid the potential disputes from the free treatment and health insurance policy, TB providers tended to ration the service by selecting the patients most likely to be diagnosed as having TB. For instance, they would register suspected TB patients who were referred from other hospitals with X-ray examination results, and just confirm the diagnosis in the TB clinic. For some suspected TB patients who came to the TB clinic without bringing any diagnostic results with them, they would recommend these patients to be diagnosed by other clinical departments in the hospital first. This in turn complicated the care processes. As Dr. M2 (TB clinic doctor, Cangnan hospital) explained, *'Otherwise, he will say I have coughed many days but not TB. But you know cough is so common due to respiratory or many other problems.'*

Technological advances and a corresponding division of specialised labor could have

also compromised communication and trust between doctors and patients. Dr. X2 (Head of Radiological Department, Cangnan hospital) compared the experiences of being a radiological doctor between now and thirty years ago:

'30 years ago, we did the X-ray ourselves, we had very good communication with patients, we can ask about their symptoms, and they tell us everything. Now we feel a distance with patients, we sit here (inside a separate room), and the X-ray specialist operate the examination, while we receive and view the X-ray result in the computer. Therefore, we have obstacle in communicating with patients. When I want to ask the patient about his symptoms, they may have left the room once finishing the exams, and we can never find them back.'

In the context of poor doctor-patient relationships, patients were regarded as being 'difficult to deal with'. Dr H1 (Head of TB clinic, Yongjia hospital) suggested, *'The patients will blame doctors for not giving them hepatonic drugs once they have hepatic damage after use of TB drugs, especially in the times of complicated doctor-patient relationship.'*

Prescribing the non-free drugs was therefore perceived to improve the clinical confidence among the TB doctors. Dr. K1 (Head of TB clinic, Yongjia hospital) commented,

'If patients in other countries do not use liver drugs that is because they may suffer from fewer side effects from the anti-TB drugs. If we do not give them liver drugs, we do not feel confident and secure. Nowadays, Chinese patients have a strong legal sense. If you damage their liver function, they will sue you immediately.'

Interviews in Cangnan also revealed great concern of assuming medical risks and responsibility of not giving liver protection drugs for preventive purpose. Dr. M2 explained why a liver function test should be conducted before TB drugs were given. This would not only help to monitor the change of the Alanine transaminase associated with the TB treatment; but also detect whether liver dysfunction already existed even

before the TB treatment, to avoid any medical disputes that TB treatment has caused the damage of liver functions. There was a strong view that even if the pre-treatment liver function test appeared to be normal, liver protection drugs should be prescribed for preventive purpose from the first consultation.

Individual doctors not only provided redundant care to avoid potential medical disputes; but were also encouraged to do so by hospital managers. As Dr. D2, Vice Director of Cangnan CDC reflected,

'Nowadays hospitals do not want to have medical disputes and so they want to make clearer medical responsibilities. When a patient is registered, they are required to do all the essential examinations. If doctors do not follow, they must take the responsibilities themselves; and if there are any problems, hospital and doctors must compensate and may be punished. So nowadays, all the big hospitals tend to prescribe all examinations for patients.'

Dr. S2 (Director, Central Laboratory Head, Cangnan hospital) shared similar views, *'For the examinations, we encourage the doctors to conduct some examinations. But why? For example, if this patient has some problems suddenly, and has disputes with the hospital, they may question, why don't you give me this or other examinations?'* Similarly, Dr. H1, the public health director of the Yongjia hospital suggested that her hospital actually encouraged the prescriptions of more examinations for similar reasons. Although she supported the prescriptions of more examinations in the hospital, she did not support to prescribe more medical examinations for TB patients.

In both sites, interviews with hospital providers showed that patients had high expectations for quality of healthcare, and were proactive in maintaining health by requesting better care for themselves. In Yongjia, the interviews suggested that the demands for 'advanced care' were associated with patients' perception of treatment intervention and technology, for example, side effects of TB treatment, accuracy of radiology and benefit of hospitalisation. Patients might expect higher level or more advanced treatment standards to maintain better health. As Dr. V1 (Radiological doctor,

Yongjia hospital) commented,

'Now it is related to the current medical environment in the TB clinic. If you do not prescribe CT for them, they would keep questioning you whether they have recovered. In fact, X-ray is good enough, but the patients would think CT can provide more accurate diagnosis. '

In Cangnan, there was similar demand from patients for more adequate care and preventive purpose, even if it was unnecessary, as Dr. M2 (TB clinic doctor, Cangnan hospital) commented.

'I use liver protection drugs as routine. But to be honest, some patients do not need to be prescribed liver protection drugs. If the patient's condition is well, it is not necessary. But you know nowadays patients care about their own health a lot; we will tell them the side effects of TB treatment...'

Interviews from both sites suggested the recent health reform had had an impact on the increasing demand of the patients. For instance, in Yongjia, the interview suggested that improvement of health insurance could induce demand for advanced care, despite the basic care was able to address the health problems. As Dr. G1 (Vice Director, Yongjia hospital) reflected, *'Some experts have been able to use the X-ray to diagnose TB. X-ray is free but CT is not. Some patients just request CT as they have health insurance, which can cover some costs. So for some patients, they prefer to be prescribed with CT.'*

As explained in Chapter 5, public hospital reform, such as implementation of zero-price mark up policy, aimed to reduce the patients' financial burden. However, non-standardised treatment still existed, although to some extent the purpose of non-standardised treatment may have changed from profit making before the reform, to avoiding medical disputes by satisfying patients' demand after the reform. Dr. X2 (Head of Radiological Department, Cangnan hospital) showed his concern for this issue:

'Before the medical reform, when we just had the CT, and we were encouraged to earn more money, and if we made a CT examination, we would be given some incentives. This was what happened long time ago. Nowadays, if patients want to do examinations, and we decline, they would complain. The doctor-patient relationship is so bad nowadays. Anyway, it is using patient's money but we can make clearer diagnosis. So overtreatment is common.'

Over demand of care by the patients was perceived to contribute to the failure of implementing free treatment policy. Dr. J2, the public health doctor in the Cangnan hospital explained how this problem occurred. On the one hand, the CDC did not provide adequate and effective promotion of free treatment policy, but just distributed health education leaflets and information to patients who might never read it. She suggested that there was a lack of public health staff dedicated to the promotion of free TB treatment policy, to educate TB patients on the benefits of this policy. On the other hand, some patients declined to use the free drugs and examinations after consulting some relevant materials and wished to recover sooner by taking 'better' drugs and using advanced technology. Some doctors in the designated hospital did not value the free treatment policy on providing benefits for poor patients, and even claimed that free drugs were unhelpful. Due to the poor communication between the CDC staff and the TB doctors based in the hospital, TB doctors might lack the essential skills to deliver effective education to patients to use the free TB services, which could be as effective as non-free services. Dr. J2 recommended the way to deal with this problem,

'Just like the chat between you and me, only if the X-ray is not clear, should they use CT. This policy should be implemented. If patients do not use X-ray, that is his/her problem. If I ask you to use CT, you decline, we have no choice. So we should suggest patients taking X-ray first. In case he is reluctant, or he insists using CT, then doctors can prescribe CT only.'

However, the interview suggested that patients' demands were often dependent on their economic conditions. For instance, the number of patients who demanded to be

hospitalised could be small as most of TB patients were poor and reluctant to be hospitalised. Also, not all demands could be met due to the limited hospital conditions. As Dr. M2 (TB clinic doctor, Cangnan hospital) explained,

‘There were limited beds in the TB wards and so general TB patients would not be admitted. Often patients with better financial situation will request to be hospitalised. So if patients have the request, or they are willing to be hospitalised, and we have spare beds, we will admit them.’

In general, this section tends to indicate the tension between doctors and patients in the context of integrated service delivery. Given this changing context of care, non-free, non-standardised prescribing behaviour has emerged as a self-protective mechanism to satisfy patients and avoid medical disputes. As Figure 6.1 suggests, increased concern from TB doctors on medical disputes strengthens their non-standardised prescribing behaviour, which would however help to reduce their concern on medical disputes (balancing feedback loop, L2). In addition, increased patient demand for care increases doctors’ concern over medical disputes, which would again strengthen their non-standardised prescribing behaviour to meet the patient demand on care (Figure 6.1, balancing feedback loop, L3). The tension between doctor and patients also result in the dissatisfaction of TB health providers (Chapter 7), which in return can worsen the doctor-patient relationship (Figure 6.1, balancing feedback loop, L4).

6.3 Perceived consequences of non-free, non-standardised prescriptions for patient care

It was generally acknowledged that TB patients tended to be poor. The CDC staff were highly concerned about the financial burden arising for patients, especially through hospitalisation, and over-use of CT and other auxiliary drugs in the designated hospitals. As Chapter 5 suggests (Table 5.1, 5.2), the LoS increased yearly for the inpatients in both hospitals, and rose to 17.5 days in 2014 from 11.35 days in 2009 in Yongjia; and 12.69 days in 2014 from 10.97 days in 2011 in Cangnan. While the medical costs for TB inpatients also increased yearly in the designated hospitals, the

average hospitalisation costs per patient in Cangnan were 11,065.89 Yuan, higher than that in Yongjia (9,368.02 Yuan) in 2014.

There was a debate among the TB doctors as to whether the economic conditions of the TB patients should be considered into prescribing decisions making. Dr L1, TB clinic doctor, Yongjia hospital revealed that in his experience, economic conditions were considered before the clinical conditions of the patients, since most of the TB patients were poor. However, Dr. K1, Head of the TB clinic in Yongjia did not agree with this argument. He argued that the economic conditions of most patients were acceptable for TB treatment; and prescribing decisions should be based on medical conditions of the patients, rather than the financial conditions. As he explained, *'Oh, if you have poor economic condition, I give you poorer drugs; this would not be the case. My purpose is to cure you, and I would not concern about other issues, as the doctors are here to treat and cure the patients.'*

In Cangnan, the TB doctor also emphasised that prescribing decisions were based on the individual conditions of the TB patients, considering both medical and financial conditions. However, financial viability was an important consideration for the prescribing decision, as poorer TB patients would be prescribed cheaper drugs. As Dr. M2, TB clinic doctor, Cangnan hospital explained,

'Liver drugs are routinely used, though depending on individuals. Some patients have hepatitis or cirrhosis. Some patients are poor, and would take common liver drugs...But some may take better liver drugs. We just prescribe very general liver drugs for poor or general patients, they are not expensive.'

There is a common recognition of the pro-poor nature of TB control in both sites. The interviews suggested that TB patients generally came from poor families with poor financial, food and nutrition support. It was reported that many of the patients lived in the remote areas far away from the general hospitals located in the county centres. As Dr. N1 (TB clinical nurse), Yongjia hospital commented,

‘Some patients live quite far away and it is not convenient for them to come to renew the drugs. The transportation is also expensive. Some poor patients complain it is too costly to travel to the designated hospital. We have many patients living faraway as we have many remote villages. Some patients are really poor...’

In Cangnan, Dr F2 (Department of TB Control of Cangnan CDC) articulated the care-seeking experience of a poor patient living in the remote area:

‘You see how those patients come to see doctors, they ride the three-wheeling bicycle, from one township to another township, and start in the dawn at 5 or 6 am, and it is 8 am when the clinic is open. Then he receives the sputum check and blood test, waits until the afternoon, and eats a few pieces of bread only, sitting beside his bicycle. For these poor patients, how can they afford? He may not come back any more (for renewal of drugs)!’

The high financial burden, together with sometimes inconvenient and expensive transportation associated with centralised care, could have contributed to patients dropping out of care, as well as the potential development of the MDR TB. In Yongjia, according to the CDC TB control officer and the TB pharmacist, fewer and fewer patients came back to renew drugs in the TB clinic in the recent months. The financial burden arising from excessive treatment in particular worsened the access to and dropouts from the treatment for migrant patients. As non-local residents, they could enjoy free TB test and drugs, however, were often excluded from local health insurance schemes due to the lack of local household registration. As TB patients were more vulnerable to losing jobs, they might end up going back to their hometown for treatment where they may receive reimbursement. As Dr D1, Head of TB control Department, Yongjia CDC explained, *‘TB treatment still costs 300 to 400 yuan per month. As many of them (migrant TB patients) have lost their jobs due to TB, they cannot afford the treatment cost. Therefore, they choose to go back to their hometown for treatment...’*

In Cangnan, there were stronger reactions towards the high treatment cost associated with the non-standardised practices from the CDC staff. As Dr F2., Department of TB Control, of the CDC complained, *‘In one course of treatment, several CTs will cost several hundred Yuan. Some patients cannot really afford it...For these poor patients, how can they afford? He may not come back any more (for renewal of drugs)! ’*

Even the hospital staff showed sympathy on the TB patients for their potential burden from the TB treatment. As S2 (Director, Central Laboratory of the Cangnan hospital) added,

‘For other patients, we provide all the relevant examinations. However, for TB, we only provide liver function test, renal function test, blood routine examination, then 30 Yuan for this, and another 30 Yuan for that, it adds up to a lot. I feel not many of the patients can assume this cost.’ Although the TB patients already received fewer medical examinations compared to other patients, their potential financial burden associated with the TB treatment remained a concern.

Due to the high financial burden from the TB treatment, TB patients might stop using the free TB service. Subsequently they would seek treatment from other health services, especially the traditional medicine for cheaper prices with fewer side effects. This therefore compromised the effect of standardised TB treatment, again risking the development of MDR TB. As Dr F2, (TB officer, Department of TB Control, Cangnan CDC) reflected,

‘It also has great impact on our free treatment policy. If one has TB, he may communicate with other treated patients who will tell them the treatment is very expensive. Therefore, he may not go to see the TB doctor further and this will increase the transmission. They wander about here and there and finally end up in a traditional medicine clinic. I have managed many patients who were treated in the traditional medicine clinics.’

In Cangnan, the public health staff in the CDC perceived the dissatisfaction of TB service and potential dropouts associated with high financial burden to be an important challenge of public health and hospital integration. As Dr D2 (Vice Director, Cangnan CDC) suggested, use of the sophisticated medical examinations such as CT was popular; but for patients this meant losing the benefit of free treatment policy. Given this, he argued that cash compensation should be provided for the TB patients to cover their payment which otherwise would be covered by the free treatment policy. This way it would also help to reduce the potential conflicts between hospital providers and patients. Otherwise, TB patients would become unhappy, which worsened the tension between patients and providers.

Facing the poor implementation of the free treatment policy in the designated hospital, the CDC staff were often nostalgic about the old days when the TB service was still provided by the CDC. As Dr. F2 of the Cangnan CDC suggested, if the TB service was still provided by the CDC, they would try to improve the treatment adherence and save money for patients by reducing any unnecessary examinations and drugs. Dr D1, Head of TB Control Department of the Yongjia CDC pointed out that *'this could be a nationwide problem. Compared to the CDC, hospitals were more likely to increase the treatment burden of patients.'*

Non-standardised prescribing behaviour places a greater financial burden on TB patients, exacerbating tensions between doctors and patients. This again increases the concerns on medical disputes, which further increases the non-standardised prescribing behaviour (positive feedback loop, L5).

6.4 Conclusion

The non-standardised prescribing behaviour of the TB providers has emerged strongly as a result of their constant adaption and self-organisation to the changed conditions of the integrated service delivery system. TB care is highly medicalised in the designated hospitals where medical culture prevails. While guidelines on auxiliary treatment are lacking, TB providers are vulnerable to the peer influence. In the context of the tensions in doctor-patient relationships, TB doctors prescribe non-standardised

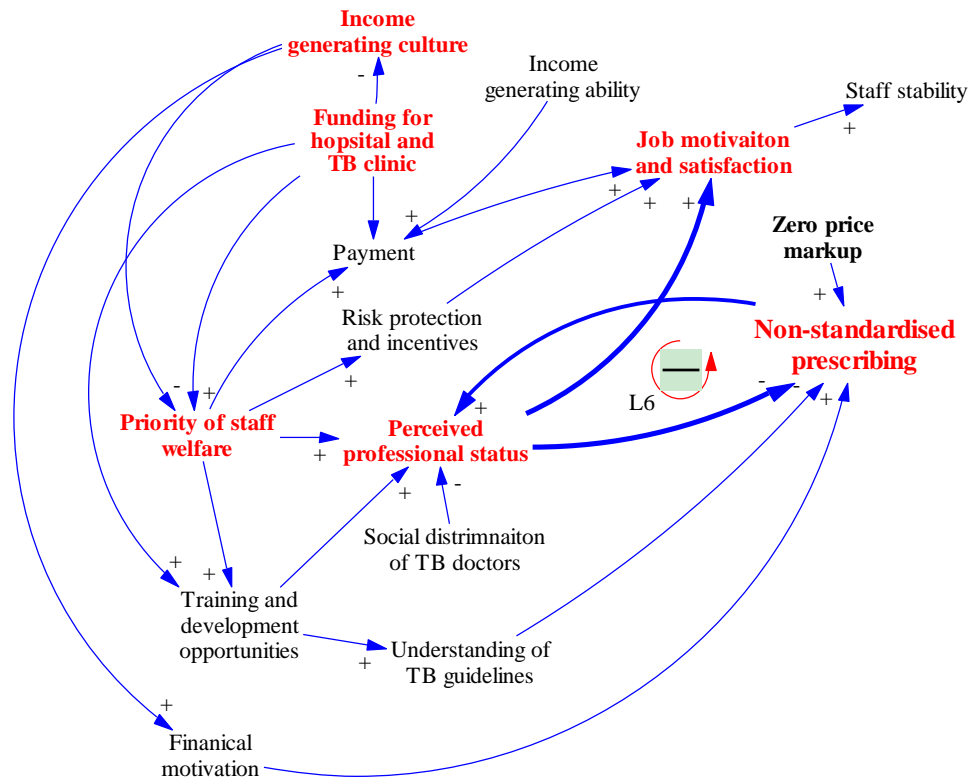
drugs and examinations to protect themselves from potential medical disputes. This may compromise the quality of TB care and cause the financial burden and treatment non-completion of TB patients, further damaging physician-patient relationships.

Chapter 7 Working environment and conditions in the designated hospitals: influence on the motivation of TB health workers

Integration of the TB service from the CDC to the designated hospital is associated with major changes for the health workforce. However, little is known about the TB health workers' motivation, welfare, and incentives in the designated hospitals. In this chapter, I will focus on the working environment and conditions of the TB health workers in the designated hospitals, and examine how these will influence their job satisfaction and motivation.

In my data, human resources emerged as an important determinant of delivery of care. The diagram(Figure 7.1) illustrates the dynamics among the factors related to the motivation and satisfaction of TB health workers, such as infectious risk and protection, payment, professional identity and government and hospital' priority for the welfare of the TB health workers. Together with broader health systems factors such as funding for the general hospitals and income generating culture, these dynamics contribute to the explanation of the non-standardised prescribing behaviour of the TB doctors in the designated hospitals.

Figure 7.1 Casual loop diagram for the motivation and satisfaction of TB health workers in the designated hospital



7.1 Professional motivation, identity and development of TB health workers

'Not long ago, there was a nurse allocated to work here. But she left after only working one day. She was a formal [with government quota²⁵], not a temporary (contracted) nurse. She was older, but the conditions were just not so good here, with poor environment, payment and high infection risk. Who is happy to come to work here? You see, we do not even receive the normal subsidy...

In the above quote, Dr. M2 (TB clinic doctor, Cangnan hospital) laments the poor working environment and conditions in the TB clinic where she worked. As Dr. D1 (Head of TB Department of the CDC, Yongjia) pointed out, *'It is a common problem in China. Health workers are generally unwilling to work for TB control.'* Poor motivation and job satisfaction of TB health workers have emerged significantly throughout my fieldwork in both hospitals, due to the perceived risk of infection, lower payment and poor professional development.

In general, whether or not the health workers would agree to work in the TB clinics depended on whether their personal interests and motivation were satisfied. In Yongjia, Dr. K1 was willing to work in the TB clinic because he had worked in a remote county far away from his hometown and wanted to come back to stay with his family in Yongjia. In other cases, as Dr. D1, Head of TB control department of the Yongjia CDC explained, working in the TB clinic was just a career bridge: when health professionals' qualifications and experiences improved, they would leave for better positions. This created the challenge of retaining experienced TB health workers amongst the TB team. In both sites, working in the TB clinics provided the favourable condition of being exempt from night duty. As Dr. N1 (clinical nurse in TB clinic of hospital, Yongjia) reflected,

'At that time, nobody was working here. I felt I was older; if still working in the general outpatient department, I need to work in the night, and I cannot see the (injection)

²⁵ Staff 'with government quota' hold a permanent contract.

needles clearly. They need one nurse here, so I took initiative to ask the leader to deploy myself to here.'

Dr. M2 (TB doctor, TB clinic, Cangnan hospital) shared a similar motivation of moving to work in the TB clinic,

'I have worked here for a longer time as nobody was happy to come to work here. To be honest, nobody is willing to work here. I have no choice because I don't want to take the night duties....If I remain in the infectious disease control department, we have to be on night duty for 24 hours. And you will not get any break in 24 hours and my health cannot tolerate it. Before it was fine, but now I am older. I will recover only a few days later from the night duty. Here in the TB clinic, it is busy but anyway is not necessary to take the night duty and at least I can have a comfortable sleep at home.'

In Yongjia, recruiting and employing a TB doctor for the TB clinic presented a great challenge. Employment at the county level hospital required relatively higher thresholds in qualifications and experiences. The hospital would first try to redeploy the staff already working in the hospital to the TB clinic. However, no one was happy to work in the TB clinic. Even if qualified doctors were recruited, they became reluctant to work in the TB clinic later on. In this case, the hospital had to compromise and attract less qualified health workers to work in the TB clinic. Dr. C1 (Vice director of hospital, Yongjia) shared the story of recruiting Dr. K1, who, as mentioned earlier, wanted to work closer to home:

'We made lots of efforts to recruit the TB doctors from elsewhere. We promised to recruit the potential candidates to our hospital, and they agreed to work in the TB clinic. But when they arrive, they become reluctant to work on TB. So we had to try other ways. We went to other counties. So we found a doctor from Lishui (a very remote county). At the time his qualifications were not strong enough to be recruited by our hospital as he worked at the community level. His technical title was low, and so was the educational qualification. But we had to negotiate with the hospital to recruit him to work in the TB clinic. I also coordinated with the Health Bureau to get his personal

files to formally recruit him. So we have tried all the possible ways.'

In Cangnan, recruitment of staff did not seem to be a problem. This could be due to the fact that the TB clinic was part of the infectious disease control department. This meant that the TB doctors could rotate to work in the TB clinic from the same department, and could be relatively easily adjusted and managed.

The perceived TB control workload and staff adequacy varied between TB staff in the TB clinic and the public health officials in the CDC or health bureau. In Yongjia, the TB clinic was not as busy as the other site, as there were two TB doctors sitting in the office. The two doctors only saw 40-50 patients per day. In the opinion of the TB staff in the CDC, the workload for the doctors was not very heavy as the work could be shared between the two doctors. According to them, employing two TB doctors was actually wasting resources, in view of the current TB burden. Since most of the patients just came back to recheck and renew the drugs, their consultations should be relatively simple and quick. However, the TB doctors argued that there was more work than diagnosing and treating the patients, as they needed to complete other public health tasks such as referral tracing and patient follow up.

In Cangnan, the TB clinic was integrated with the infectious disease control department. In general, the interviewees reported a serious lack of health staff involved with TB and infectious disease control. In the infectious disease control department, there were 16 staff including eight doctors and eight nurses. These staff were mainly based in the wards, but also provided consultations in a number of infectious disease clinics, including TB clinics. Due to the staff shortage, and the low motivation of health workers to be based in the TB clinic, the hospital had to reportedly set up a 'rotational' TB clinic, meaning that staff were rotated from the central departments, including infectious disease control department, outpatient, nursing, laboratory, and financial office. During the initial period of integration, six doctors rotated on the TB clinic, with every doctor sitting in the TB clinic for two months. However, the hospital management were concerned that this would damage the continuity of care. The hospital then decided to send one doctor to be based in the TB clinic, which has caused

concern about staff shortage. As Dr. M2, TB clinic, Cangnan hospital complained, *'I am exhausted, and do not have enough of a break throughout the year.'* Dr. E2, Head of TB Control Department, Cangnan CDC agreed that *'TB doctors are too few, and the TB clinic is very busy'*.

However, Dr. B2, the Head of Department of Disease Control in the Health Bureau did not agree that the staffing was insufficient and perceived the workload of seeing 40-50 patients a day to be reasonable. She suggested that doctors should have positive working attitudes rather than complaining about the workload. This reflects the bureaucratic attitude of the health official, but also the commonly found expectation of altruism and devotion to public benefits for staff working in the public institutions.

In both sites, the interviews suggested that shortage of TB doctors had affected the development and quality of service to some extent. In Yongjia, the CDC public health staff suggested that, the current staffing failed to meet the increasing demand for quality improvement. Despite not necessarily affecting the clinical aspect of quality, this has affected the public health function of the TB control. For example, as Dr. F1, Vice Director of Yongjia hospital admitted, the TB staff in the TB clinic actually failed to conduct systematic and adequate follow-up of TB patients as required. Staff shortages also affected the development of the TB clinic business. The county CDC planned to provide the TB service in the weekends and holidays to improve the access for patients such as migrants who were not available to see doctors during the weekdays. However, this initiative was not implemented due to the lack of staff. In Cangnan, as Dr. E2, Head of TB Control Department, Cangnan CDC suggested, having only one TB doctor sitting in the consultation room did not allow for mutual discussion and learning between TB doctors, which would otherwise help to reduce the chance of misdiagnosis. Having only one doctor also compromised the time for patient communication and consultation and quality of health education. He attributed this problem as *'a medical resource problem'*.

The professional identify of being a TB doctor was self-perceived to be low. In general, working in the TB clinic was considered to be 'second-rate'. Dr L1, TB doctor in the

TB clinic of Yongjia hospital, had a nice personality and good relationships with colleagues. At the beginning, the hospital wished to develop him as a lead TB doctor. However, he felt it was not promising to work in the TB clinic and had attempted to leave the post. The interviews with TB doctors suggested that the perceived low professional identity was due to working with poorer patients with lower education, associated with poorer income for TB doctors. This created the sense of losing authority and dignity as a 'low-status' medical doctor. As Dr. F1 (Vice Director, Yongjia hospital) explained,

'Indeed, many doctors do not want to work in the TB clinic. As I said just now, income of the doctors is a problem, with lower status and treatment. You say you are a TB doctor, but actually, they do not have any power. For other doctors, if patients ask for treatment, doctors will have good faces²⁶. But for TB patients, most are poor, vulnerable, had little education.'

The TB health workers generally felt discriminated against, in the professional sense. They perceived themselves as being 'misplaced' to the TB clinic, as the hospital could not find a more suitable post for them. Their sense of discrimination could be derived from the fact that 'TB' was an infectious disease, and working in the infectious disease clinic would have affected the social connections and family lives of the TB health workers. A male TB clinic laboratory worker, in Yongjia Hospital, added that,

'The discrimination is serious indeed. If we say we are working in the infectious disease, nobody will be happy to marry me...I feel depressed about working here. I want to leave here after working a few years. Furthermore, it is not good for a man to keep working on TB. You just dare not tell your friends what you are doing.'

In Cangnan, the Head of TB Control Department of the CDC also pointed out that TB doctors were discriminated against for treating TB, as an infectious disease: *'I have a feeling that compared to doctors from other departments; TB doctors are*

²⁶ A common slang expression in China, to indicate the identity, dignity, pride.

discriminated for treating TB. This is concerned with the type of diseases. After all, TB is an infectious disease.'

Professional development remained a great concern for the TB doctors. They complained that TB staff working in the smaller hospitals (designated hospitals) had limited promotion opportunities, while those working in the higher-level hospitals were entitled to better professional titles and reputations. In particular, as the interviews with the public health officials suggested, TB treatment only needed to follow TB guidelines with simple and repeated clinical knowledge and skills. This prevented TB staff from developing and applying advanced medical knowledge in routine practice. As Dr. C1 (Vice Director, Yongjia CDC) commented, *'The knowledge is limited for the TB practice. The drugs to be prescribed are pre-specified. You don't need to think further about the prescription and you just need to follow the guidelines.'* Dr. A1 (Vice Director, Yongjia Health Bureau) shared similar concern,

'Working in the TB clinic will not help to improve their medical knowledge, but will also decrease their capacity as they are not exposed to the treatment of other diseases. TB is just such a small thing. If they see TB every day, it is too monotonous for them. Every day the doctors will prescribe the same drugs for the patients with same symptoms. So they are not happy with this.'

TB doctors in both hospitals attended the training workshops organized by the prefectural and provincial CDCs and Anti-TB Associations each year. These workshops were often delivered by the TB control experts, and were held three to four times per year. The workshop covered a broad range of topics, including diagnosis, prescription, treatment, laboratory test, supervision and management, awareness improvement and sensitisation of TB control. Laboratory tests and diagnosis, and emerging issues like MDR TB control, seemed to be more prioritised in the training. Within the hospital, in Cangnan, the infectious disease control department would include some limited training on the treatment of general TB in their routine training on infectious disease treatment. However, this was not the case in Yongjia, where the TB clinic was not part of the infectious disease control department. In general, there

was a lack of specific training on rational prescribing for general TB patients in both hospitals. Again, this could be due to the lack of relevant guidelines. However, the strong tendency to admit smear positive patients among TB doctors in Cangnan could also reflect the lack of updated training on TB treatment since DOTS-based outpatient treatment has become the main approach of treatment since 1990s.

This section indicates the poor professional motivation and perceived low professional identity to work in the TB clinics. TB doctors perceive themselves to have lower professional identity and status, which is more so in Yongjia than in Cangnan. A balancing feedback loop (Figure 7.1, L6) is formulated between the perceived professional identity and non-standardised prescribing behavior as TB doctors strive to improve their 'decreased' professional identity through prescribing more. The poor sense of professional identity of the TB doctors would stimulate their non-standardised prescribing behaviour, which would help to gain back (and improve) their sense of their professional identity. In addition to the social discrimination, working with poor patients, poor training and professional development opportunities, and organizational structure provide a plausible explanation to the perceived low professional identity among TB doctors. The TB clinic in Cangnan is part of the infectious disease control department. This allows the TB doctors to be more integrated with the broader infectious disease training, practice and skill development. However, this is not the case in Yongjia, where the TB clinic is relatively independent and isolated from the broader infectious disease control and other clinical departments. The independent setup of the TB clinic may also foster their sense of being discriminated as TB doctors working for poor patients.

This section suggests the poor TB staff stability due to the poor motivation and satisfaction of TB health workers. While the independent TB clinic in Yongjia has the potential to maintain the stability of the TB team, there is great challenge in recruiting and retaining the competent staff. In Cangnan, the 'turn-around' TB clinic results in a sense of staff and service instability. However, this reduces the recruitment barriers, since the TB staff would mainly rotate from the existing departments of the hospital.

7.2 High infectious risk, low health protection and responses for health workers

In both hospitals, the potentially high infectious disease risk and other health concerns were important factors discouraging health workers from working in the TB clinics. As Dr. L1 (TB doctor, TB clinic, Yongjia hospital) suggested, *‘For the doctors, the biggest challenge is being afraid of being infected by TB.’* Initially, he was discouraged from becoming an infectious disease doctor as his future father-in-law tried to prevent him from marrying his daughter. It was not until after marriage that he started to accept this work. The TB staff perceived that working in the TB clinic would weaken their immune systems. Dr. Q1, TB laboratory staff member of Yongjia hospital, reported that he had developed a skin problem since working in the TB clinic. This problem was getting worse and worse, and he was looking for other posts within or outside this hospital at the time of interview. Dr. O1 (Information nurse, TB clinic, Yongjia Hospital) showed great resentment towards the CDC staff and other senior officials, who had less exposure to the risk of infection, but who they believed neglected their own exposure:

‘At the grassroots level, things are different: you are facing TB patients every day; therefore, you have high level of risk. For those who are at the upper levels, as they do not make direct contact with patients, they do not have risk. We face higher risk, but we do not get better benefits. The doctors do not want to work here, as it is so dangerous. The CDC staff would feel happy, as they do not work here.’

In Cangnan, the interview found that TB doctors and laboratory staff who need to have face-to-face contact with patients or sputum samples remained at most risk. As Dr. S2 (Head of the Central laboratory Department, Cangnan hospital) commented,

‘The most important issue is the infectious risk due to the face-to-face communication between TB doctors and patients. They need to talk a lot with patients, as patients will not understand if you just explain once. It is also dangerous for the laboratory staff. So TB doctors and laboratory staff are the most dangerous.’

In both hospitals, however, not all the staff were concerned about the infection risk.

Working in TB clinics actually helped to improve their awareness of the potential risk, due to the physical existence of the TB clinic and patients wearing facemasks, as compared to working in the non-TB clinics where the infection risk was hidden. As Dr. U1 (TB pharmacist, Yongjia hospital) commented:

‘We can see the infectious risk here. But the infectious risks outside the department cannot be seen. The central hospital system is different from ours. At least here, we will know what diseases patients have and we can improve protection ourselves. But for the patients outside the TB clinic, we don’t know what diseases they have. So it is more dangerous. So this is the hospital system; it is not an issue of being dangerous or not, but a matter of being visible or not.’

Dr. P2 (Clinical nurse, TB clinic, Cangnan hospital) shared similar concerns:

‘Some people may feel uncomfortable to work in the TB clinic. But I think it is the same in other departments. TB patients have some sense of inferiority and they do not wear masks after they walk out of the clinic. Then when you walk out of the clinic, you don’t know whether this patient has TB or not. Therefore, I think here we are all clear that they are TB patients, so we feel better instead. But some of my colleagues do not agree with me, thinking it is too terrible. I feel it is fine, as long as I do better protection.’

The lack of risk assessment and protection measures remained a concern for TB control in both hospitals. For instance, protective facemasks were limited due to the expensive cost. Especially in Cangnan, the infectious disease control department has to be responsible for such expenses due to the ‘department independent accounting system’. On the other hand, TB staff preferred not to wear masks, which made it difficult for them to breathe. In addition, they were concerned that wearing facemasks would give the impression of discriminating against TB patients. As Dr. D1 (Head of TB Control Department, Yongjia CDC) commented, *‘Contradiction exists in the occupational protection. If doctors are seen fully armed and protected, patients may feel discriminated. It is fine for bigger hospitals, but patients may not be very happy if doctors are too covered up; this is particularly true in these smaller hospitals.’*

Dr. D1 added that this problem was due to the poor prioritisation of TB control, as compared to the HIV/AIDS control, and the current priority on protecting patients rather than doctors:

'We mainly provide supervision and guidance for patient management. However, risk assessments are lacking in terms of the exposure level of TB doctors. Currently, TB work is patient-centered; most of the attention is given to patient protection, and little has been stressed regarding TB healthcare workers' infection and its corresponding prevention. In contrast, AIDS has been included as an occupational disease [for doctors] whereas TB is not.'

Dr. S2 (Head of the Central Laboratory Department, Cangnan hospital) gave another example of the lack of risk assessment and protection for the long working hours in the infectious disease control environment.

'Now the problem is for the doctors and laboratory staff, who have to work there for a long time during the day. I remember there is requirement that infectious disease control staff should not continue to work more than 2 or 3 hours to avoid being too tired to decrease the immune ability. But we start from 8 am and work until the afternoon.'

After the SARS epidemic, the infectious disease control allowance was supposed to be provided to infectious disease control doctors. In Yongjia, the TB workers received the infectious disease control allowance of RMB7 per day. However, this was considered to be too little. As Dr. O1 (Director of Infectious Disease Control Department, Yongjia hospital) commented,

'We doctors have poor working conditions, and have great infection risk. We are working in the infectious disease control department, but have you found the government provided input to us? No! We only receive the subsidiary of RMB7 per

day, while exposed with the infectious diseases every day. It was RMB7 tens of years ago, now still RMB7.'

In Cangnan, the infectious disease control staff did not even receive this small incentive. Despite their complaints, and the coordination of the public health department, the hospital paid little attention to this. Dr. R2 (Director, Department of Hospital Infection Control, Cangnan hospital) has even presented the policy document to the hospital director, although his efforts were futile. Little attention of the hospital paid to this issue has demoralized the TB and other infectious disease control staff, who perceived this as '*not an issue of money itself but mental incentives*'. Dr. M2 (TB clinic, Cangnan hospital) complained, '*To be honest, nobody will care about the few yuan. Only a little money, at most RMB7 per day. But you just don't make us comfortable. Would you agree?*'

This section suggests that, occupational health concerns, especially regarding the infection risk, exist among the health workers working in the TB control settings. However, occupational health and protective measures for TB health workers are not prioritized in the hospitals, with the lack of risk assessment, inadequate use of personal protection equipment and lack of infectious disease control incentives. These problems appear to be more serious in Cangnan, where no infectious disease control allowance was provided, and the infectious disease control department has to be responsible for such expenses (further discussed in Section 7.3). This may be related to the independent costing system in Cangnan hospital, which will be further discussed in the next section.

7.3 Satisfaction with and mechanism of payment

Satisfaction with payment

The payment of hospital staff included the basic salary based on the professional titles as specified by the government, as well as the performance part of payment, which was based on the number of patients treated and income generated from the services. While the gap of the basic salary among the doctors was small, the bonus could vary a lot. In Yongjia, the TB staff were dissatisfied to receive the same bonus as the

logistical staff, i.e. 80% of the average bonus of the hospital staff. On the other hand, the bonus of the clinical departments could be up to RMB 5,000-6,000 per month, several times higher than that of the TB staff. TB staff complained that the payment was not consistent with the exposure to the high infection risks. As Dr. N1 (Clinical nurse, TB Clinic) complained *'We are at great risk of working here. There are so many smear positive patients. I am under great pressure. I do not want to work here anymore, I just want to retire, haha'*. As all the TB staff received the fixed bonus from the hospital, no major difference in the coefficient of the bonus existed between the clinical doctors and other staff in the TB clinic. As Dr. G1, Vice Director of the hospital pointed out, TB staff had different workload, nature of job, and contributions, *'it is best that the payment and bonus between doctors and other auxiliary staff, such as laboratory staff, pharmacist, nurse and cashier would be different. I think the doctors' bonus should be higher...'*

In Cangnan, similarly, staff of the infectious disease control department resented the fact that they did not receive better payment than their peers from the other departments. They complained that the payment did not match the increased workload of TB control since the TB service integration in the hospital, in addition to the perceived high infectious risk. As Q2 (Director of Infectious Disease Control Department, Cangnan hospital) complained, *'Before TB was integrated here, we had this number of staff, but since integration our workload has increased, but income not. Why? Why no income increase?'* Dr. M2, TB doctor of the TB clinic complained that they received a monthly bonus of 2,000RMB, the lowest in the hospital, and not higher than those working in the administrative and logistic departments. There was no major difference in bonus among the TB doctors and other doctors in the department, as each doctor produced similar profits for their department in their hospital. As Dr. M2 reported, there was only a difference of RMB 100-200 for the bonus among the doctors in the department.

Mechanism of payment

In Yongjia, the TB clinic was not included in the performance-based system as with other clinical departments. This decision was based on consideration of fairness of

paying TB staff. Under the performance-based system, the more patients they received, the better income they would make. In this case, as Mr. J1 (Head, Department of Accounting and Finance, Yonjia hospital) suggested, the performance payment in the TB clinic might be even lower than that of the current method, based on the proportion of hospital average given its lower number of patient visits. Therefore, giving a fixed bonus comparable to the logistical and administrative departments was regarded as being a special favour for the TB staff.

However, there was strong performance-based mind-sets in income allocation. It was taken for granted that TB staff should receive less income than staff from other clinical departments, due to their poor income generation ability. As Dr. B1 (Head of Disease Control Department, Yongjia Health Bureau) explained,

'The TB clinic staff complained that they had lower payment. But in some departments like the surgical department, they had bigger business turnarounds, so are financially rich. But the number of patients in the TB clinic is almost fixed; plus that some patients often go to the Wenzhou No.2 hospital, the patient number would reduce for the TB clinic.'

Based on the public health nature of TB control work, some respondents argued that the fewer patient visits and poorer income generation ability should not become the excuse of poorer payment for TB staff. As Dr. M1 (Information nurse, TB clinic, Yongjia hospital) argued, the government had subsidised the TB clinic, and the TB clinic had business turnover; this justified the need for improving the payment and bonuses for the TB staff.

In Cangnan, the TB clinic staff rotated, and received their payment from their original departments. However, the TB clinic, as part of the infectious disease control department, could not escape the influences and practices of 'independent accounting', where the TB doctors' income was related to their performance of income generation. Ms. L2 (Head of Financial Department, Cangnan hospital) clarified that the 'performance payment' was not based on the economic indicators as before, i.e. not related to the prescriptions

of drugs and examinations; but dependent on other indicators such as technical grades, number of patient visits, average hospitalization days. This was expected to help to reduce the bonus gap among different doctors, and encourage health workers to work in public health posts with poorer income generation ability.

In reality, the infectious disease control department, like all the other clinical departments, should hand in the monthly income to the hospital. The hospital would then allocate the income back to the department, after adjusting some indicators, such as bed occupancy, length of stay and patient visits at the hospital level. In general, the more the department handed in to the hospital, the more the department would get back. The department then started to allocate the bonus to the individual staff members, mainly based on their technical titles using coefficients (e.g. chief physician may receive the bonus at 1.2 times of the baseline amount, deputy chief physician 1.0 time). Therefore, although the bonus might not be related to the individual prescriptions as before, income generating ability still mattered for the department and staff. Dr. B2 (Head of Disease Control Department, Cangnan Health Bureau) was negative about the performance-based system. She suggested the system was created to respond to the lack of funding and resources from the government to the hospitals, but that it would cause the overtreatment of the patients.

Under the 'independent' costing system, several factors could affect the potential income or bonus of the department or individual staff. The hospital would deduct operational costs of the department including any bills and personal protection equipment from the financial income of the infectious disease control department. In addition, the payment of individual doctors would be deducted if they violated the regulations of drug prescription. Each department was given the proportional limit of the costs of drugs among the total cost of treatment per month. If exceeding the limit, all the staff in the department would be deducted of the individual bonus even if the individual doctors might not necessarily exceed the ceiling of drug prescription. As Dr. M2., TB clinic doctor, Cangnan hospital complained:

'Our bonus is deducted every month. You see, I am working in the TB clinic, and my

drug prescription may not exceed the target proportion, but still get deducted. It is all department staff that will be deducted of money. Each department has different proportion of drug control, and some department has higher proportion, while some lower, as long as you exceed this limit, all the staff in the department will be deducted of the money.'

The drug control policy and the zero price mark-up policy have placed the infectious disease control department in an embarrassing and vulnerable situation regarding income generation. Treatment of infectious diseases required more extensive use of antibiotics and antivirus than medical tests and examinations as compared to other clinical departments. Therefore, health workers could easily be fined and have income deducted due to exceeding the drug control limit; while prescribing more drugs did not generate more profits due to the zero-price markup policy. On the contrary, the other clinical departments could justify prescribing more high-tech examinations to boost their income and avoid the negative impact of the drug control and zero price mark-up policy. This reality suggested the inequality of income generation between the infectious disease control department and other departments, and created unfairness for this department under the economically orientated performance assessment. As Dr. N2 (TB doctor, Infectious Disease Control Department, Cangnan) commented,

'Our bonus is sometimes lower than that in the supportive departments. Our hospital has the drug control system. We mainly have anti-hepatitis and anti-virus drugs, and if the prescribing rate is higher than the target, we will get fined. Anti-virus drugs are quite expensive. In our department, some TB inpatients have low protein, and serious anemia and so drugs should be used relatively more. It is not fair to include the business volume to the bonus assessment.'

The zero price mark-up policy still leaves room for hospital admissions, which allows for profit making. However, the beds for TB patients and other infectious disease patients were limited. The already constrained bed numbers faced the risk of being wasted, owing to low utilisation, due to the need of preventing cross-infection in the wards: when a TB patient was admitted and moved into a three-bed room, the hepatitis

patient could not be admitted into the same room. This suggests another source of cost reduction and weakened income generating opportunity for the infectious disease control department.

In general, the unified implementation of performance-based payment and ‘economic assessment’ among all the clinical departments was regarded as being unfair for the infectious disease control department in line with the potential loss of income, infection risks and increasing public health tasks and emergencies. As Dr. Q2 (Head of Infectious Disease Control Department, Cangnan hospital) complained,

‘Our economic assessments system is the same as that in other clinical departments, but when there is emerging infectious disease, they say you need to do this and do that! We have become ‘superman’. There is not any preferential policy. This is not only related to TB work, but also others. Last year H7N9 outbreak lasted several months, and we have managed to respond.’

This section suggests that, income generation ability remains the main criteria of bonus allocation for the TB staff in the designated hospital (Figure 7.1). This emergence of the income-generating culture in the TB control setting of the hospital, as derived from the marketised health systems and poor government funding of hospitals suggests the path-dependent feature of the decision making for bonus allocation. However, the TB control work only generates a minimum income for the hospital. This creates the sense of unfairness in payment for the TB staff, as frontline health workers, in line with the occupational health risks and increasing public health workload. In Yongjia, health workers receive the same bonus as the administrative and logistic staff, i.e. a fixed bonus of 80% of the hospital average bonus. In Cangnan, bonus is based on the hospital-wide performance-based system although the infectious disease treatment itself does not generate as much income as other clinical departments. On the other hand, as indicated in Chapter 5 (Section 5.4.2), non-free, non-standardised prescribing behavior is also due to the financial incentives of the TB providers. In a context where bonus allocation is influenced by the income generating ability, TB providers may not be happy to provide free TB care, but would only have perverse incentives to prescribe

more for the patients. Unlike the case in Yongjia, the TB clinic in Cangnan is affiliated with the infectious control department of the hospital. TB doctors in Cangnan may therefore have stronger financial incentives, where the income-based performance based system applies for the TB clinic doctors. This may be less so in Yongjia, where the TB clinic is separated from the infectious disease control department, TB doctors receive fixed bonus from the hospital. This may explain the higher admission rate of the TB patients, regardless of the uncomplicated TB patients or all types of TB patients in Cangnan hospital.

7.4 Lack of government commitment to improve staff welfare

In both sites, the interviewees complained about the poor investment from the government for improving staff benefits and the infectious environment. In Yongjia, the interview suggested 'staff stability' in the designated hospital as a potential crisis for TB control. The interviews with the CDC staff suggested that the current health policy prioritised protection of the patients' interests, while neglecting the benefits of the health providers, which explained why infection control staff were not treated well. Although the government has realised this problem, the government had to prioritise improving patients' benefits rather than health providers'. On the one hand, this may be due to the lack of government funding to address the benefits of both the providers and patients at the same time. On the other hand, the government may perceive this strategy to be more cost-effective than providing benefits to the health providers. Since the TB staff received payment from the government or hospital, doing good work for TB control remained as their responsibility. However, neglect of the providers' benefits may demoralise the providers in return. As Dr. D1 (Head of TB Control Department, Yongjia CDC) complained,

'... there is not enough money from the government as well. Actually, I think if the policy always favors the patients, stability of the healthcare workers will be poor. That is why clinical doctors are reluctant to work for TB. Good infectious disease control can only be achieved under a well-established incentive system. Most of the posts in the infectious disease control belong to the 'vulnerable group' (due to the reasons discussed above); and no one is willing to work as a TB doctor. You always favor

patients and so our health workers feel discouraged. It is not good; we need some balance.'

The hospital had considered addressing the infection risk and improving the benefits for TB health workers. However, this initiative could not proceed due to opposition from other departments and the need to balance the interests of TB and non-TB staff. In particular, the hospital leadership perceived that staff working in the TB clinic had already enjoyed preferential conditions. As Dr H1 (Head of Public Health Department, Yongjia hospital) explained,

'Sometimes we will put forward this issue and argue for them. But the leaders say some staff like nurses are actually given special care or have been given special preferential consideration, and their work is quite relaxing. For example, the health conditions of the information nurse are not so good and cannot take the night duties and that is why she is redeployed from another department.'

On the other hand, lack of strong support from the health authority prevented the hospital from implementing the wider incentives for the TB health workers. As Dr. C1 (Vice Director of Yongjia CDC) explained,

'We cannot do anything if the Health Bureau does not issue the policy. At the beginning, they discussed and proposed this, but other departments complained about this, and so the Health Bureau did not approve the proposal. The hospital will follow the Health Bureau's policy.'

In Cangnan, there was stronger complaint about the Health Bureau's neglect of the incentives and welfare of the hospital staff in the face of increasing public health emergencies and tasks. Dr. D2. (Vice Director of the CDC) was critical: the Health Bureau did not concern itself with staff welfare but focused too much on the performance of implementing the public health tasks in the hospital. As Dr Z, (Director, Department of Infection Control, Cangnan hospital) complained,

'It is required that the hospital must assume the responsibility of public health and infectious disease control tasks. The government has given you the tasks, but no more subsidies. We want to assume the responsibility, but no incentive policy. Things are just like this; I find I was lost.'

This remark again suggests that the bureaucratic implementation of the public health in the hospital could demotivate the health workers to deliver good quality of care in the end.

This section suggests that there is poor attention and priority of the government and hospital to the TB staff welfare that has contributed to the perceived poor risk protection, poor payment and professional identity in the designated hospital (Figure 7.1). In Yongjia, there is perceived low policy priority of protecting patients rather than health workers. Balancing the interests and welfare is challenging between the TB staff, who generate little income, and other clinical staff who generate more income for the hospital. In Cangnan, bureaucratic implementation of the public health in the hospital has clearly neglected the incentives and welfare of the TB and infectious disease control staff.

7.5 Conclusion

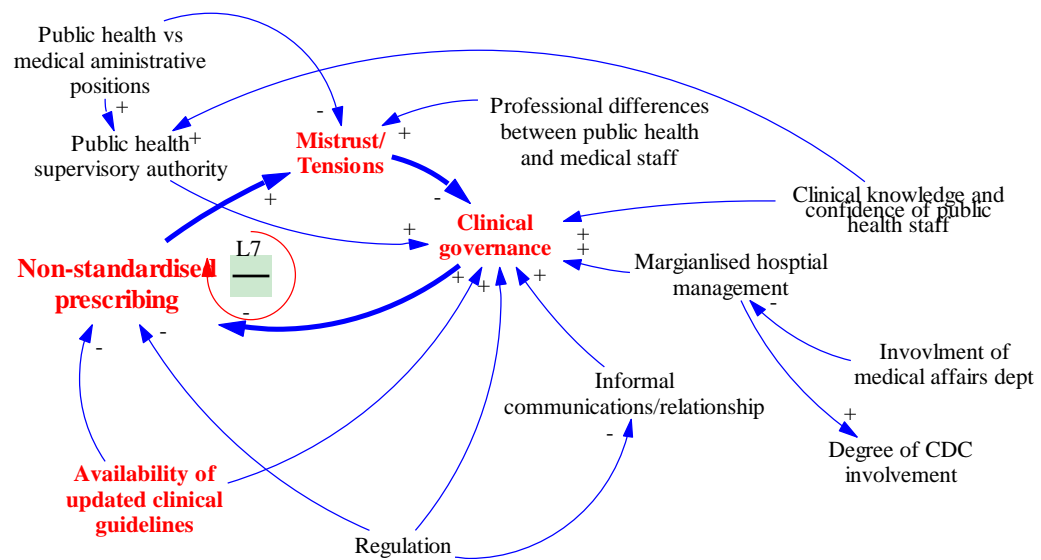
Job satisfaction and staff motivation was low and stability of the workforce for TB services was jeopardised. This chapter indicates that workforce issues for TB control in China, specifically the welfare and incentives of infectious disease control workers, have not received sufficient priority to motivate TB clinic staff. The root of the problem appears to be that public health work is not a significant source of income for Chinese hospitals. This dominates hospital decision making about bonus allocation and occupational health protection. This, together with the perceived low professional identity of the TB health workers, has demoralised the TB health workers in the designated hospitals.

Chapter 8 Working relationships in the context of integrated service delivery: shaping clinical governance

Integration of TB service within designated hospitals involves a change in working relationships. The integrated service delivery in the TB designated hospital involves relationships across different actors such as the Health Bureau, CDC and designated hospital, and relationships within the designated hospitals where clinical TB care is delivered. In this chapter, I seek to explain how the working relationships may shape clinical governance, which in turn, has an influence on the prescribing behavior of the TB doctors in the designated hospital. In this thesis, clinical governance is defined as the management of the quality and standards of TB clinical practices in the designated hospitals.

The diagram (Figure 8.1) illustrates the dynamics among the factors related to the clinical governance of TB control in the designated hospitals. These factors include, for instance, tension between public health and medical professionals, clinical knowledge and confidence of the public health professionals, public health supervisory authority and regulations. The diagram helps to explain how the dynamics among these factors have contributed to the non-standardised prescribing behaviour of the TB doctors in the designated hospitals.

Figure 8.1 Casual loop diagram for clinical governance of TB control in the designated hospital



8.1 Inter-organisational relationship

In this section, I will first analyse the role of the health bureau in the management of the integrated service delivery, before moving to the analysis of the working relationships between the CDC and the designated hospital.

8.1.1 The role of the Health Bureau

In Yongjia, the Health Bureau visited the designated hospital twice a year. The supervision was mainly related to the technical aspects of the TB control in the hospital, such as the use of medicines. For instance, if they learned from the CDC that certain medicines were over used, they would check and discuss with the CDC's TB control department. Supervision also included non-technical aspects of the work such as understanding the motivation and needs of TB staff. As Dr. B1 (Head, Disease Control Department, Yongjia Health Bureau) suggested,

'If a doctor works here for a long time, he or she may get tired of the job, which can result in the carelessness during the work. Therefore, we will go and talk to them, stressing the importance of their work and strengthening professional training as well as their communication with the CDC.'

However, the supervision of the Health Bureau for the designated hospital is perceived to be unsatisfactory, with insufficient understanding of the TB control in the designated hospital. The Health Bureau is criticised for inadequate assessment of the TB control work in the designated hospital, and lacking communication with the designated hospital. As Dr. G1 (Vice director, Yongjia hospital) commented,

'I feel the Health Bureau should provide more support to our designated hospital. Try to understand our hospital more fundamentally. The leaders should come to visit, and anything that goes wrong should be corrected and improved. We cannot say this model is all good, but it is going well so far. Think how to improve it, focus on it, and refine it.'

Dr. H1 (Head, Public Health Department, Yongjia hospital) added that, *'I do not feel Health Bureau people have done very important things, but maybe because we don't have much contact with them.'* Dr. C1 (Vice director, Yongjia CDC) shared similar concerns: *'In fact the Health Bureau has not conducted enough supervision; otherwise things will be much better.'*

The Health Bureau mainly relied on the CDC to supervise the TB practice in the designated hospital, since they trusted the CDC staff who better understood the specific and technical aspects of TB control. However, the capacity of the CDC to supervise the hospital was also concerned by the health official. As Dr. A1 (former Vice Director, Yongjia Health Bureau) pointed out, *'The CDC is very important in coordinating the work of the hospital, but it is not enough if we only rely on the CDC.'* On the other hand, he appeared to indicate better trust of the previous model of TB service delivery, when the CDC was responsible for the TB diagnosis and management. That was also the rationale for the intervention from the Health Bureau: *'If the CDC conducts the TB diagnosis and treatment, they will pay greater attention to this. Now that this work is conducted by the designated hospital, if the hospital does not give due attention to this, we Health Bureau need to supervise to correct the problem.'*

In Cangnan, 'administrative supervision' was emphasised, which meant that the supervision of the Health Bureau was based on the results of 'technical supervision' of the CDC. The Health Bureau did not communicate directly with the hospital or intervene unless the CDC was unable to address the problems as identified from the technical supervision. The CDC conducted formal supervision on a six-monthly basis to explore detailed technical issues and provided technical instructions. The Health Bureau then looked into the key issues identified by the CDC and tried to understand the reasons behind these issues. They would then conduct the follow-up supervision to check whether the hospital had addressed the problems, especially during the annual performance assessment. Dr. B2 (Head, Department of Disease Control, Cangnan Health Bureau) tried to emphasise that supervision of the Health Bureau should focus on the overall assessment based on the CDC's reporting rather than in detail. She said,

'It's more like a double-track mode of technical supervision and administrative supervision.'

8.1.2 The relationships between the CDC and designated hospital

Both counties belong to Wenzhou Prefecture. The prefectural CDC conducted quality control of the TB control in the county designated hospitals every month through on-line reporting systems and field visits, covering key TB control activities such as rates of timely reporting and sputum test, auxiliary drug use, medical costs and follow up management of TB patients. The results of the quality control were publicised through official documents issued to all the counties with performance ranking for each TB control activity. In both sites, the county Health Bureaus assigned the county CDCs to manage the TB control in the hospitals. The county CDC played an important role in coordinating, guiding and supervising the TB control work of the designated hospitals.

In Yongjia, the interview suggested that the county CDC had reduced the frequency of supervising the TB clinic as compared to the GFATM period. The county CDC visited the designated hospital and conducted the formal supervision based on quarterly TB control reports and other existing assessment indicators, such as sputum test rate. During the supervision, they would review the implementation of the TB control policies in the hospital, for example, whether the treatment success rate, referral rate have reached the targets. If any problem was identified by the supervision, the CDC staff would note it down on the supervision form and discuss it with the TB clinic and public health department staff directly. In fact, the supervision was not limited to the quarterly based formal supervision. As the county CDC was located quite close to the designated hospital, the TB control staff in the CDC could visit the hospital to discuss the TB control work at their convenience. Interviews with TB staff in the TB clinic revealed resentment about the way supervision was carried out, which was critical of mistakes but not necessarily supportive or cognisant of progress. As Dr. M1 (Information Management Nurse, Yongjia hospital) explained,

'Just like what they did today. They came and pointed out some existing problems,

such as problems related to patients' follow-up, but we rarely gain praise. Occasionally I will make the mistake, and they will call to remind me to correct. '

Despite the relatively frequent supervision activities, the hospital staff perceived the CDC staff to have inadequate communications with the designated hospital. This resulted in a lack of understanding about the details of TB control in the hospital. For instance, Dr. E1 (TB staff, Department of TB Control, Yongjia CDC) confessed that he was not clear whether or how the designated hospital conducted the quality control of TB treatment. On the other hand, the supervision from the CDC was perceived to be too superficial with insufficient enforcing power. As Dr. G1 (Vice Director, Yongjia hospital) commented,

'If we want to improve this model of care, we need to think more about it carefully. Especially the CDC staff should think more, and come to guide and support us more frequently. They should not come to supervise superficially or just 'in the format'. They should speak out for any problems, and should not be hindered by 'face' ²⁷problems. The supervision needs to be strengthened. Sometimes it is hindered by the face problem: as we are familiar with each other, it is not good to criticise.'

In reality, daily management of TB control mainly relied on the informal communication between the CDC, hospital leaders and TB clinic staff to address the emerging problems. For instance, some patients complained to the CDC staff that the TB doctors in the designated hospital prescribed too many non-free drugs. The CDC staff then talked to the hospital director in charge of TB control. The hospital director went to check about the doctor's prescriptions. After he confirmed that the problem existed, he would discuss this issue with the TB doctors.

In Cangnan, similarly, formal supervision of the CDC was conducted once per quarter. This covered all aspects of TB control in the hospital, such as sputum check, case reporting, internal referral and drug management. Based on the results of supervision,

²⁷ This is Chinese slang commonly used in daily life to suggest the respect of people. For instance, if one is criticised in the public for his/her wrong doing, this is regarded as 'losing face'.

the CDC would identify the problems and develop the supervision reports, especially during the initial period of integration. Every three or six months there was also an internally circulated report on the TB control work in the designated hospital, covering management, information, outpatient, follow up, and loss to follow up of the TB patients.

At the time of the field work, the TB clinic work in the designated hospital was three years after integration, as the Health Bureau disease control official suggested, 'in the period of standardization and normalization'. The CDC had a strong involvement in, and supervised the work of, the TB clinic directly. The CDC staff responded to and supported the TB clinic staff to solve the problems directly. Only if the problem was not addressed and persisted would they report it to and discuss with the hospital director. Whenever possible, they would avoid reporting the problem to the Health Bureau in the first instance. Only if the problems could not be addressed between the CDC and the hospital, the CDC would write critical letters or reports to the Health Bureau. The Health Bureau officials would then communicate with the hospital leaders to address the problem. This communication-based management was regarded as an effective measure of quality control due to the tradition of 'saving face' rather than providing open criticism in the meetings.

Indeed, the CDC resorted mainly to the mutual communication and informal supervision approach between the two organisations for the daily management of hospital TB control. The CDC TB control officers suggested that they had the opportunity to meet and communicate with the hospital TB staff during the various meetings held by the Health Bureau. The CDC staff always took the initiative to approach and communicate with the hospital leaders, public health and TB staff wherever needed. The CDC's TB control officers also conducted the informal supervisions frequently, thanks to the integration that relieved them from the clinical work of TB control that they used to undertake. As Dr. E2 (Head, TB Control Department of Cangnan CDC) commented, *'Informal supervision is conducted every two weeks, and any time when they have problems. Now our burden of work is less heavy than before. Sometimes I just go to see how well it is operated.'* Dr. B2 (Head,

Disease Control Department of Cangnan Health Bureau) also stressed that the hospital leaders should realise the importance of frequent communication with the CDC; while criticisms from the Health Bureau would not necessarily help to improve the performance of TB control in the hospital. Thanks to the frequent communications, the TB clinic work has improved and become more standardised since integration. It is worth mentioning that the public health aspects of the performance such as the case recording system nearly ranked the best in Wenzhou prefecture.

TB control in the hospital was managed and coordinated by the CDC, via the public health department. In both sites, public health departments maintained very good relationships with the CDCs. During my field visits, I observed that public health doctors had frequent and harmonious communication with the CDC's TB control officers. Dr. H1 (Head of Public Health Department, Yongjia hospital) contrasted her relationship with CDC staff and her hospital colleagues as follows:

'Probably because the quality of the CDC people is high, with good personality. They maintain a good relationship with us, and I feel our relationship is better than the relationship with colleagues in our hospital... we mutually encourage each other. If we have any difficulties, we remind each other mutually. As for our own colleagues in the hospital, as our nature of work is different and they are clinical and we are public health. We don't have a shared understanding.'

Dr. J2 (Public health doctor, Cangnan hospital) added: *'I feel we have a very good relationship with the CDC staff. They would invite us for dinner, and when they come to our hospital, we would also reciprocate the invitation.'*

Despite the generally good communications between the CDC and the designated hospitals, interviews with the CDC staff identified the challenges of the CDC staff in conducting the clinical management of the designated hospitals in both sites. The first challenge is due to the self-perceived technical inferiority of the CDC staff. In both sites, the CDC staff revealed a lack of confidence in conducting TB training and supervision of the clinical work of the TB designated hospitals, due in part to their

public health background. Dr. D1 (Head of TB Control Department, Yongjia CDC) commented:

'We just look at the handwriting and records of the patient charts and quality of information management. As public health doctors, we do not have as good an understanding of the clinical science as the clinical doctors...They [hospital doctors] have stronger capacity than us. How can we have the ability to train the hospital doctors?'

As a result, clinical appraisal mainly relies on the hospital itself, rather than on the CDC. Dr E1 (TB control officer, Yongjia CDC) even doubted whether the CDC should have the responsibility of supervising clinical work of the doctors in the TB clinic. He suggested an expert working group would be appropriate and important to ensure the quality of clinical TB care in the hospital.

In Cangnan, the CDC staff also reported difficulty in convincing the hospital staff that their prescriptions were 'irrational'. Dr. F2 (TB Control Officer, Department of TB Control, Cangnan CDC) complained: *'Rational or not, just as what we said just now, you say it is not reasonable, you are not the doctor, and he is the doctor, you dare not say his prescription is not reasonable. You feel it not reasonable, but you just cannot tell exactly what and why is not reasonable. That is the case indeed.'*

The second challenge is mistrust. In both sites, medical professionals in the designated hospitals exhibit low levels of trust towards the CDC's public health staff. In both hospitals, some hospital staff saw themselves as having stronger professional and technical capacity than the CDC staff. As Dr. V1 (Head of Radiological Department, Yongjia hospital) commented,

'You CDC cannot supervise us, you do not have the ability to guide us, why, for the radiological examination, and you can't compare with us who are professional. We are professional and you are not, so CDC staff, have you read the X-ray before, maybe not. Their professional levels are different from ours, right...I tell you, our

radiological facility is stronger than the CDC's, so it will be beneficial for the patients and their technical capacity is so poor.'

In Cangnan, the hospital staff also emphasized their superior professional competency in prescribing practices. Dr. Q2 (Head of Infectious Disease Control Department, Cangnan hospital) suggested that service integration mainly aimed to counter the unprofessional and ineffective prevention and control by the CDC:

'The CDC does not provide specific quality control on rational use of drugs. In this regard, I think we are more competent and in better position than the CDC. Otherwise, there is no need for the TB service to be integrated into our hospital...The reason why the TB clinic is transferred from the CDC to the hospital is due to the poor quality of prevention and control in the CDC. It is possible that they lost patients and diagnosed TB inaccurately. The CDC staff is not as professional as hospital professionals are. That is why the drug resistance rate is growing.'

In Yongjia, the hospital staff also showed little respect for, and even looked down on, the CDC staff. As Dr. G1 (Vice Director, Yongjia hospital) reflected,

'I talked to our TB doctors. When the CDC staff come, you should treat them in a better way. What they say is correct although their positions may be different from yours. They speak from the disease control perspective, but you are from the medical perspective. You should try to understand them, and vice versa, and this is the way to go.'

This problem not only existed in the designated hospital, but also was common in other health service settings. As Dr. G1 (Vice Director, Yongjia hospital) suggested,

'The CDC staff were ignored when they visited the primary care level and other hospital services. They [primary care and other hospitals] have become more and more non-adherent to the requirements of the CDC. Some hospitals just respond to them

superficially, but in fact, they did not fulfil the requirements as required by the CDC, and are lacking in the sense of responsibility...'

While the interviews suggested the compromised communications between the CDC and designated hospital due to the professional differences and conflicts, they also indicated the weakened power and authority of the public health facilities in the context of integrated service delivery.

A third challenge identified was the reduced power of the CDC due to the administrative, hierarchical, and control culture in the health sector. In Yongjia, the Health Bureau and CDC respondents attributed the difficulty of supervision and management to the fact that both institutions were at the same administrative level under the leadership of the Health Bureau. Given that the hospital director was often the vice director of the Health Bureau, the situation became even more challenging. The ambiguous responsibilities of the CDC could also reduce its power to conduct the clinical management of the TB care in the hospital. As Dr. E1 (TB control staff, Yongjia CDC) pointed out, there were no official documents that clarified the specific roles of clinical supervision and management of the CDC, but only the general roles and responsibilities of the hospital and CDC in TB control. He explained that if the CDC staff did not have a good attitude towards the hospital staff, they would not be welcomed for visits by the hospital staff. Given the lack of the supervisory power of the CDC, there was a strong appeal from the CDC staff for more direct involvement of the health authority in the clinical management of TB work in the designated hospital. For instance, the CDC staff raised such suggestions as *'handling the responsibilities of TB management and supervision from the CDC back to the Health Bureau'*; *'Always holding an official document from the Health Bureau in each supervisory visit'*; *'the health inspection institute accompanying the CDC staff to conduct the visit'*.

In both sites, the health authority and CDC staff felt that managing the TB clinic had become more challenging due to the reduced control of the TB clinics after integration. In Yongjia, Dr. L1 of the CDC complained that it was even difficult for them to collect

the TB work reports from the designated hospital. He suggested a radical change of the integration model to gain back the power and control of the CDC over the TB clinic. For instance, TB clinic staff could be based in the designated hospital; however, they should be employed and managed by the CDC. In Cangnan, the CDC staff also suggested that their difficulty in managing and supervising the clinical behavior in the hospital was in part due to the CDC's reduced control over the resources for the TB clinic. Dr D2 (Head of Disease Control Department of the Health Bureau) argued that it had been easier to supervise the work of the TB clinic when it was part of CDC, as it was '*...business within the same family*'.

This section identifies the tension between the CDC's public health professionals and designated hospital's medical professionals in the management of the integrated service delivery. This tension is mainly contributed by the professional differences between public health and medical professionals. The CDC is well positioned to monitor and supervise the public health based DOTS strategy, including free TB treatment, but not the clinical treatment other than that recommended by the guidelines. This compromises the clinical governance of the integrated service delivery, together with the CDC's weak supervisory power for the clinical practice. This weakened power is not only related to their public health profession, but also related to their administrative position equated to the hospital, and loss of control over the integrated service and resources. As a result, the compromised clinical governance may lead to the non-standardised prescribing practice, which would again worsen the tension between public health and medical professionals (Figure 8.1, balancing loop, L7).

8.2 Intra-hospital working relationship

In both hospitals, there were no regular meetings related to TB control across the departments. 'Feedback meetings', which often included the hospital director, TB clinic staff and the CDC's vice director responsible for TB control, were called only when problems occurred. Informal communications through telephones and face-to-face meetings, often via public health departments, remained important in daily management of TB control work in the hospitals. The section analyses the role of the

public health department in coordinating and managing the TB control activities in the designated hospitals.

8.2.1 Tension between the public health department and the TB clinic

The public health department played a key role in coordinating and managing the TB control activities. However, the public health department is in a disadvantaged position to manage the TB clinic. In Yongjia, some tensions between the public health department and the TB clinic were observed during the field visits. Given the independent setup of the TB clinic, there were ambiguous hierarchical and administrative systems between the TB clinic and other departments. For instance, the public health director thought that the TB clinic was under her leadership, with the administrative position slightly below that of the other departments. However, the TB clinic director thought that the TB clinic was independent, administratively equal to other departments and not administratively affiliated to the public health department of the hospital. The ambiguity of the affiliating relationship of the TB clinic reduced the power and authority of the public health department in managing the TB clinic. Therefore, the direct communication with the TB clinic from the hospital leadership remained important. As Dr. C (vice director of the hospital) reflected: *‘We’ve received the quarterly report with rankings from the prefectural CDC last week. So that I can see what to improve, and sometimes they [county CDC] will ask me to talk to the TB clinic as the public health department does not have power to speak.’*

In Cangnan, the public health staff in the hospital also felt it challenging to monitor the clinical behavior of the TB doctors. As Dr. H2 (New Head of Public Health department of the hospital, Cangnan) admitted: *‘I am not a medical doctor, I don’t know whether the prescription is rational or not.’* In fact, the interview has suggested that the public health department was in a better position to manage the public health aspects of TB control such as reporting and internal referral. Dr. J2 (Staff, Public Health Department of Cangnan hospital) described her routine supervision work:

‘For example, today we received a report of TB patient or suspected TB patients, and we can view it from our internal/communicable disease reporting network, but we just

do not see they are referred to the TB clinic. Sometimes they [doctors in other clinical departments] don't know how to refer, or there are no referral slip, and no clear referral procedures, they only know they need to report, this is how the cases fail to be referred. For example, in this case of providing the referral slip, we will call to ask them to complete the referral slip. Sometimes they are busy, or don't know about this, that is why we supervise and remind them in time ...'

As a result, quality control within the hospital for the TB clinic was relatively weak and largely relied on the guidance from the CDC. Dr. K2 (Head of Infectious Disease Control Department) stated that they did not implement their own quality control measures as “...*the TB clinic does what the CDC requires it to do. Otherwise they [CDC] would say 'this is not right, and that is not right.'*” Dr. K2's remarks on the one hand indicated the poor accountability of hospital in TB control, and on the other hand, the hospital's mistrust of the 'authoritative' role of the CDC in TB control.

8.2.2 The role of public health department vs medical affairs department

In both sites, it was widely recognised that TB control in the hospital was the business of the public health department. The Medical Affairs Department, which was supposed to manage the quality and safety of the medical affairs, and regulate doctors' behaviour, had limited involvement in the management of the TB clinic.

In Yongjia, the medical affairs department was mainly responsible for the general administration and coordination of the TB clinic, for example, supervision together with the Health Bureau and CDC regarding distribution of TB drugs, isolation of TB patients, coordination of the group consultations and other general issues. Given its unique position in connecting the CDC and hospital, the public health department was perceived to be in a better position to manage the TB clinic. Indeed, as Dr. E1 (TB Control Officer, Yongjia CDC) pointed out, *'The public health department is a connection point for us and the hospital. They help to pass our words to the TB clinic.'* Dr. I1 (Head of the Medical Affairs Department, Yongjia hospital) noted that he actually rarely visited the TB clinic for supervision; and even argued that the TB clinic should be managed by the CDC. Dr. H1 (Head of Public Health Department, Yongjia

hospital) revealed her dissatisfaction with the limited involvement of the medical affairs department in TB control. The unclear responsibility and accountability of the public health work in the hospital has caused the mistrust between the public health and medical affairs department. As Dr. H1 commented,

'I think the medical affairs department has some misunderstanding of public health work. The head of the department thinks that TB work should be managed by the public health department. But I do not think it is our sole responsibility as much of the doctors' work should be supervised and supported by the medical affairs department.'

While the CDC staff admitted the limited role of the public health department in supervising clinical behaviour, they advocated more involvement of the medical affairs department in supporting the TB control in the hospital. As Dr. E1 (TB Control Officer of Yongjia CDC) suggested, *'It is best if there is detailed guidance from the medical affairs department. It must be good if the medical expert group come to support and guide the TB clinic. But we don't have now.'*

Unlike in Yongjia, there appeared to be clearer responsibilities and better collaboration in terms of public health work between public health and medical affairs department in Cagnan. However, this was mainly limited in the responses to public health emergencies, where the public health-related medical work was significant. Regarding the TB practice in the TB clinic, Dr. K2 (Head of Medical Affairs Department, Cangnan hospital) felt that care practices had become standardised:

'After 2-3 years' integration, it has become standardised. Now we have fixed doctor based in there and they are familiar with the full process of care. At the national level, there is guideline and flow of diagnosis and treatment. It is evidence based medicine and it has advantages and we need to adhere to. They go for training on a regular basis and we also send others to participate. ...sometimes they will use liver drugs. In general, this is standardised. Many drugs are well controlled. Most patients are tested for sputum, X-ray, and regular liver and renal functions. I feel in general TB care meets the national guidelines.'

This remark suggested that the medical administration in the hospital had limited knowledge and understanding of the current TB control practices in the TB clinic. It appeared that they did not realize the serious extent of non-free, non-guideline recommended prescriptions; or even if they recognized the problem, they may tend to agree with the clinicians and perceive this as ‘standardised practice’.

This section suggests that the public health department plays an important role in coordinating the integrated service delivery within the designated hospital. However, tension exists between the public health and TB clinic staff in both hospitals. While this tension mainly arises from the unclear administrative position of the TB clinic to the public health department in Yongjia, professional differences existed in both hospitals. Tension also arises between the public health department and medical affairs department, especially in Yongjia, due to the unclear responsibilities and less involvement of the medical affairs department in TB control. Such tension should compromise the clinical governance of the TB control in the hospital, which would further strengthen the non-standardised prescribing behaviour of the TB doctors. The non-standardised prescribing behaviour would further increase the tension between medical and public health professionals in the hospital (balancing feedback loop, L7). This section, together with Section 8.1, suggests the non-linear relationship between the tensions between public health and medical professionals, clinical governance of integrated service delivery and the non-standardised prescribing behaviour of the TB doctors in the designated hospitals.

8.3 Regulations

As illustrated in Chapter 6, clinical guidelines were not clear for the conditions of whether and how the auxiliary treatment should be provided. This not only contributed to the unstandardised treatment of TB, but also provided challenges for health authority and CDC to conduct clinical supervision. Dr. A1 (Head of Disease Control Department, Yongjia Health Bureau) explained their efforts in controlling the prescribing of non-free treatment for TB patients:

'We have monitored these situations. We know the total numbers and how many of the drugs prescribed are free. The hospital may have certain non-free medicines and we control the prescribing rate of those medicines. The main request is to use free medicines. We just have a general control. That is to say, mainly use free medicines and control the use of non-free medicines. The TB control department of the CDC needs to report to us every quarter. Like last year, if use of non-free medicines is too much in this quarter, we will supervise and talk to the hospital director to reduce its use rate. And we will check the most widely-used medicines as well.'

This remark suggested that, despite the Health Bureau's awareness of the problem and efforts to monitor the problem, there was a lack of criteria for standardised assessment. In both sites, quality control was mainly limited to the standardisation of free TB treatment. In other words, the supervision did not concern whether auxiliary drugs and tests were prescribed, but whether the free, fixed-dose combination of TB drugs were correctly prescribed, or whether the individual TB drugs were 'wrongly' prescribed. In addition, tracking the prescriptions of non-free, non-guideline recommended drugs was difficult. There is a national TB case management information system, but this system only records the prescriptions of drugs and examinations covered by the free treatment policy. This system does not record the second-line anti-TB drugs and other auxiliary drugs and examinations prescribed for the TB patients.

In Yongjia, within the hospital, there was appraisal of rational use of medicines including antibiotics jointly organised by the departments of pharmacy, medical affairs and finance. The appraisal team included directors of these and other departments such as the infectious disease control department. The doctors with 'irrational' prescriptions of medicines were meant to receive a fine. Dr. II (Head of Medical Affairs Department) emphasized that the pharmacy department was more involved in this appraisal process as they had better understanding of the drug compositions and prescriptions. However, the TB pharmacist could share little experience about this. This appraisal system appeared to be poorly or superficially implemented among TB doctors.

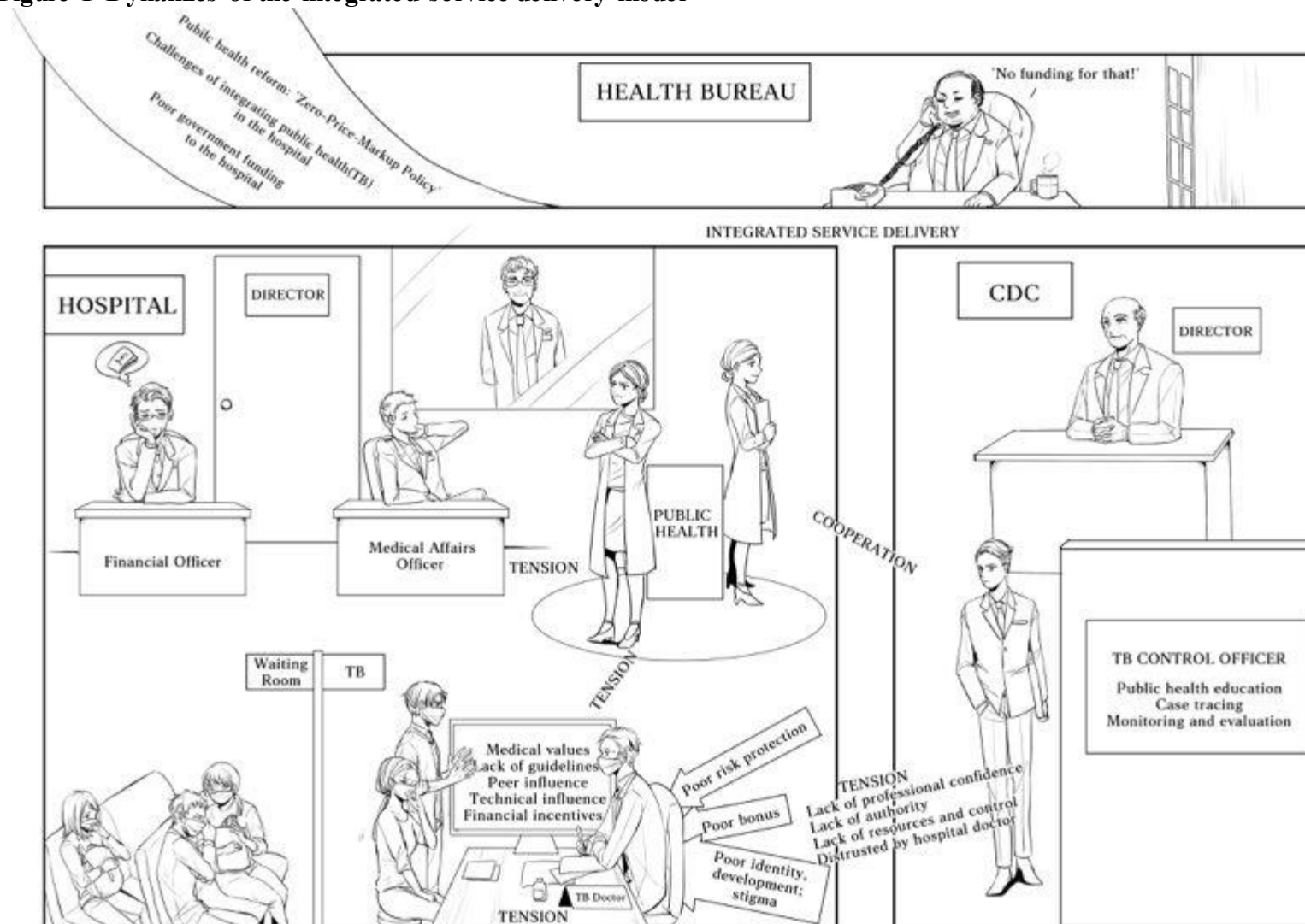
In Cangnan, within the hospital, however, there was a policy on restricting the use of drugs. As discussed in Chapter 7 (Section 7.3), the percentage of drug use in the total monthly prescriptions should not exceed the pre-defined percentage of the total cost of the prescribed treatment based on the nature of different clinical departments. In case of breaching this regulation, all the staff in the department would be given a fine by reducing the performance payment (bonus). However, Dr. Q2 (Head of Infectious Disease Control Department, Cangnan hospital) complained that, *'It is difficult for the department to fulfill the target of income generation, due to the drug control. Therefore, we may need to increase their medical examinations.'* This suggested that unintended consequences arose as controlling the prescribing of drugs caused the increased prescription of medical examinations and tests, due to the target-based departmental income generating mechanisms.

This section suggests that health authority and public health professionals are in a challenging situation to monitor the prescribing behavior of the TB doctors in the designated hospitals, due to the lack of effective regulations and systems on prescribing of the non-free, non-standardised treatment.

8.3 Conclusion

In both sites, professional differences remained the biggest barrier to shaping clinical governance for TB control in the hospitals. The public health nature of the TB programme largely contributed to its limitations in providing clinical training and supervision in the hospitals. Tensions emerged during the interactions between the public health and medical professionals. Together with lack of effective regulatory frameworks, this compromises the clinical governance of the TB control in the hospital. This contributes to a grey area when it comes to prescription of non-indicated drugs and medical tests for TB in the designated hospitals.

Figure I Dynamics of the integrated service delivery model



*Designed by the author and drawn by Mr. Yige Xu, a comics lover in China.

Chapter 9 Discussion and conclusion

In this chapter, I discuss the contribution of this thesis to the philosophical thinking, CAS thinking and TB service integration. Then based on the framework that was refined as the data analysis progressed, I discuss the major themes emerging from the findings to address the specific questions this research seeks to answer. This is followed by discussion of the limitations of the thesis, before drawing out the practical recommendations for improving integrated service delivery for TB control in China and other LMICs. I conclude this chapter with reflections on possible avenues for further research.

9.1 Contribution of the thesis

In this chapter, I first reflect my philosophical position in undertaking this study, especially regarding the application of the CLD. This is followed by the reflection of the contribution of this thesis to the CAS thinking including the refinement of the CAS-informed conceptual framework, and TB service integration literature.

9.1.1 Reflection on the philosophical position

This study aims to understand the prescribing behaviour of the TB doctors in the context of integrated service delivery. As a critical realist, my main purpose is not to identify statistically generalisable laws (positivism) or to identify the lived experience or beliefs of social actors (interpretivism). Instead, I aim to provide deeper levels of explanation and understanding, or identify the mechanisms of health systems influences that explain the prescribing behaviour of the TB doctors in the designated hospitals (McEvoy and Richards 2006; Gilson 2012b). Consequently, I have adopted an interpretive approach to achieve such understanding.

The CLD (Figure 9.1), as an important tool of the CAS theory, provides a useful means to achieve this purpose. The CLD is meant to ‘model’ the dynamic relationships among different variables. The development of the CLD involves two levels of interpretation. The first level is the summary and interpretation of data into variables (themes, codes)

alongside the thematic analysis. In the CLD, the variables only present the 'categories' of the data in a neutral way- with their 'extent' or 'level' open for inquiry. For instance, although the actual data suggests the lack of guidelines, in the CLD, the variable has to be summarised and interpreted as 'availability of guidelines', implying both 'with' and 'without' guidelines. The second level of interpretation is the interpretation of the relationships between the variables. The CLD is linked up between the two variables either positively (the two factors change in same directions) or negatively (the two factors change in opposite direction). The diagram sometimes includes closed cycles either defined as a reinforcing or balancing feedback loop. For instance, a closed loop exists between 'non-standardised prescribing behaviour' and 'medicalisation of TB care'. This loop is interpreted as 'the stronger medicalization of TB care, the more serious non-standardised prescribing behaviour; and vice versa'. Similar to the development of the variable categories, the relationships (arrows) are plotted based on the interpretation of the perceptions and/or experiences of the interviewees. In some cases, these are based on my intuition. Therefore, the CLD provides a useful approach to explore the causal mechanism in a qualitative way. This exercise not only helps to modify and expand the original conceptual framework, but also to strengthen the internal validity of the case study as discussed in the Chapter 4(Section 4.2).

As compared to the narrative data that is rich and individualized, the CLD has to (by definition) 'reduce' and operationalize variables in a more rigid way, because this approach provides the foundation for quantitative modelling. Although I did not pursue further quantitative modelling and simulation in this thesis, the exercise provides a useful platform for the dialogue between the critical realist and positivist. In general, the CLD, including the variables and relationships is similar between the two study sites as the qualitative data shows consistent patterns. Any discrepancy is identified and presented in the results.

9.1.2 Contribution to the CAS thinking

As explained in Chapter 4, most of the studies on TB designated hospitals in China are quantitative studies that aim to describe the health systems implications of integrated service delivery for patient care including issues like delay, prescribing practices and cost. There has been minimal attention given to explain the problems associated with the integrated service delivery. A number of international studies, including hospital-based DOT studies have identified power relationships and trust as key barriers to integration (Probandari et al. 2011; Kielmann et al. 2013). However, these papers do not focus on exploring the prescribing behaviour of the TB doctors in the context of integrated service delivery, nor do they explore how changes of health system conditions associated with integration might influence provider prescribing behaviour. Few studies have explicitly adopted CAS theory and considered the hardware and software components of the health systems.

Using CAS thinking has helped to shift attention from a functional analysis of the health systems 'building blocks' and their mechanical interactions towards a more dynamic way of examining emergence, adaptation and relationship management. Similar to most of the studies adopting CAS reviewed in Chapter 2, this study identifies common CAS features of the integrated service delivery system. For example, this study identifies

- Feedback loops (e.g., the relationship between prescribing behaviour, tension between public health and medical professionals and governance);
- Emergent behaviour and unintended consequence(e.g. non-standardised prescribing behaviour);
- Self-organising and adaptive behaviour (e.g. non-standardised prescribing behaviour as a way of adapting to the changing context of care(e.g. patient relationship for self-protection);
- Mental models (e.g., public health vs. medical values);
- Path dependency (e.g, following the traditional income-generating based performance culture for the newly integrated public health service) and

- Tension between public health and medical professionals, which emerges strongly during the management of integrated TB care.

Therefore, this study differs from the conventional health systems studies which adopt a mechanical approach, such as those focusing on the analysis of building blocks (Zou et al. 2012; Zou and Wei 2017); those using the input-process-output logic (Probandari et al. 2008; Kress et al. 2016) and those attempting to depict the dynamic relationships of the building blocks without exploring the emerging and adaptive behaviour (Mutale et al. 2013; Webster et al. 2013). Similar to the previous studies (Barasa et al. 2016; Topp et al. 2015; Bozzani et al. 2014; Zou et al. 2015), this study integrates the analysis of hardware (e.g. building blocks) and software (e.g. values) in the framework and analysis. This avoids the problems of over-focusing on building blocks by neglecting the software elements. On the other hand, unlike other studies that focus more on human factors and interactions (Varghese et al. 2014; Zhou et al. 2015a), this study also values the importance of building blocks as a starting point for research.

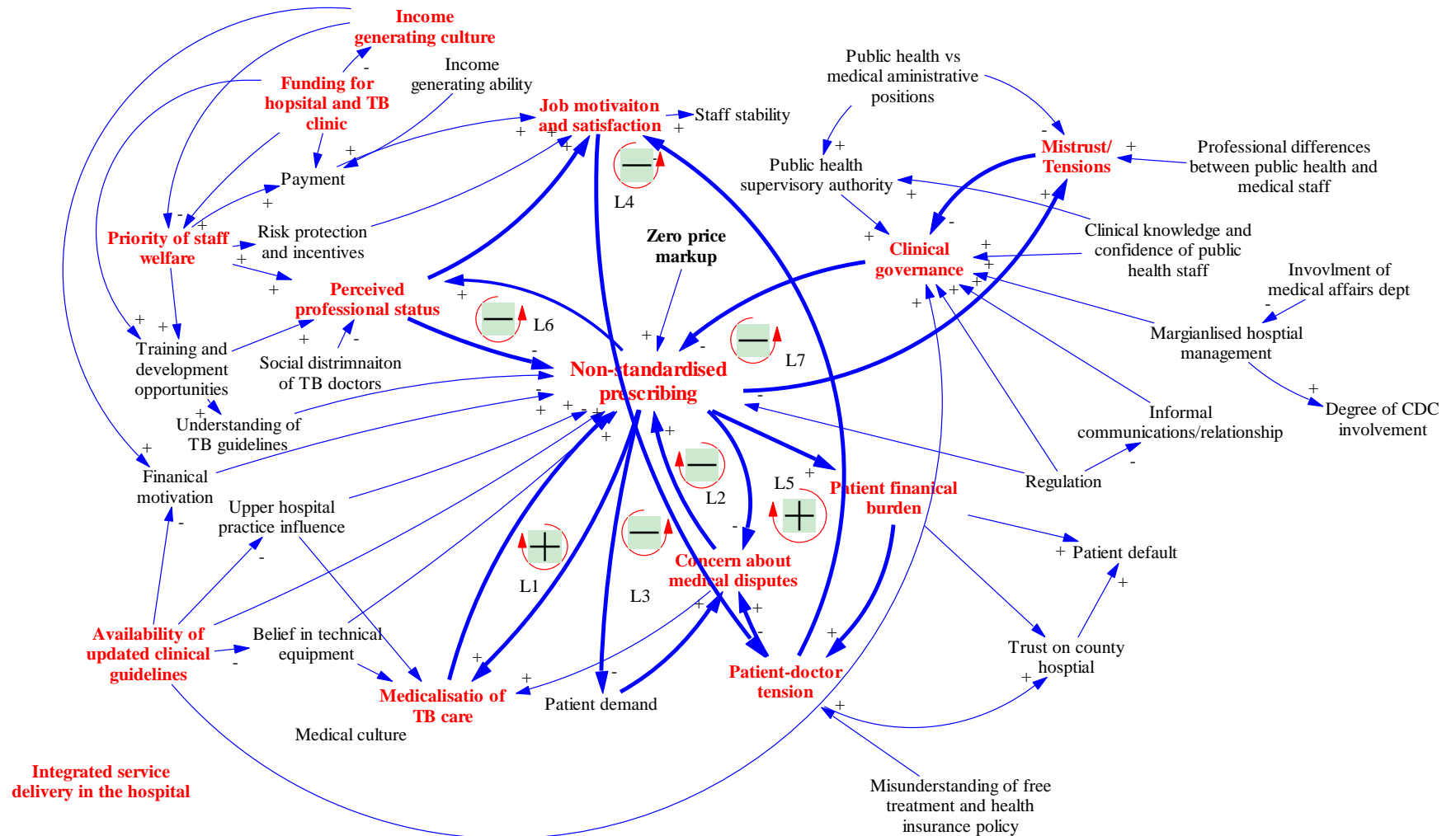
The CLD provides the foundation for the understanding of the CAS features. The three CLDs as presented in Chapter 6, 7 and 8 (Figure 6.1;7.1;8.1) visualise the dynamics and pathways of influences on medicalisation of TB problem, motivation of TB health workers, clinical governance of TB care in the designated hospital respectively. Figure 9.1 presents the full CLD (synthesis of the three CLDs), to illustrate the dynamic and non-linear relationships of the health systems components and processes that influence the prescribing behavior of the TB doctors. The diagram suggests that many health system components and processual factors interact to result in the emergence and unintended consequence of non-standardised prescribing behaviour. It also assists in the understanding of the adaptive behaviour of TB provider to the changing context of care (doctor-patient relationship and environment). In particular, the diagram presents a number of feedback loops that can enhance or buffer changes that occur in the integrated care delivery system. Most of the feedback loops include the non-standardised behaviour of TB doctors, suggesting the strong emergence or unintended consequence of integrated

service delivery on this. These feedback loops capture the dynamic relationships between the non-standardised prescribing behaviour of the TB doctors and other health systems components and process, such as

- Medicalisation of TB care (positive feedback loop, L1).
- Concern from the TB doctors on medical disputes (balancing feedback loop, L2).
- Patient demand on care and concern from TB doctors on medical disputes (balancing feedback loop, L3).
- Financial burden on TB patients and doctor-patient tensions (positive feedback loop, L4).
- Perceived professional identity (balancing feedback loop, L6).
- Tensions between public health and medical professionals, and clinical governance of integrated service delivery (balancing feedback loop, L7).

The CLD also identifies the dynamic relationships between the tension between the TB doctors and patients and job motivation and satisfactions of TB health workers (balancing feedback loop, L5).

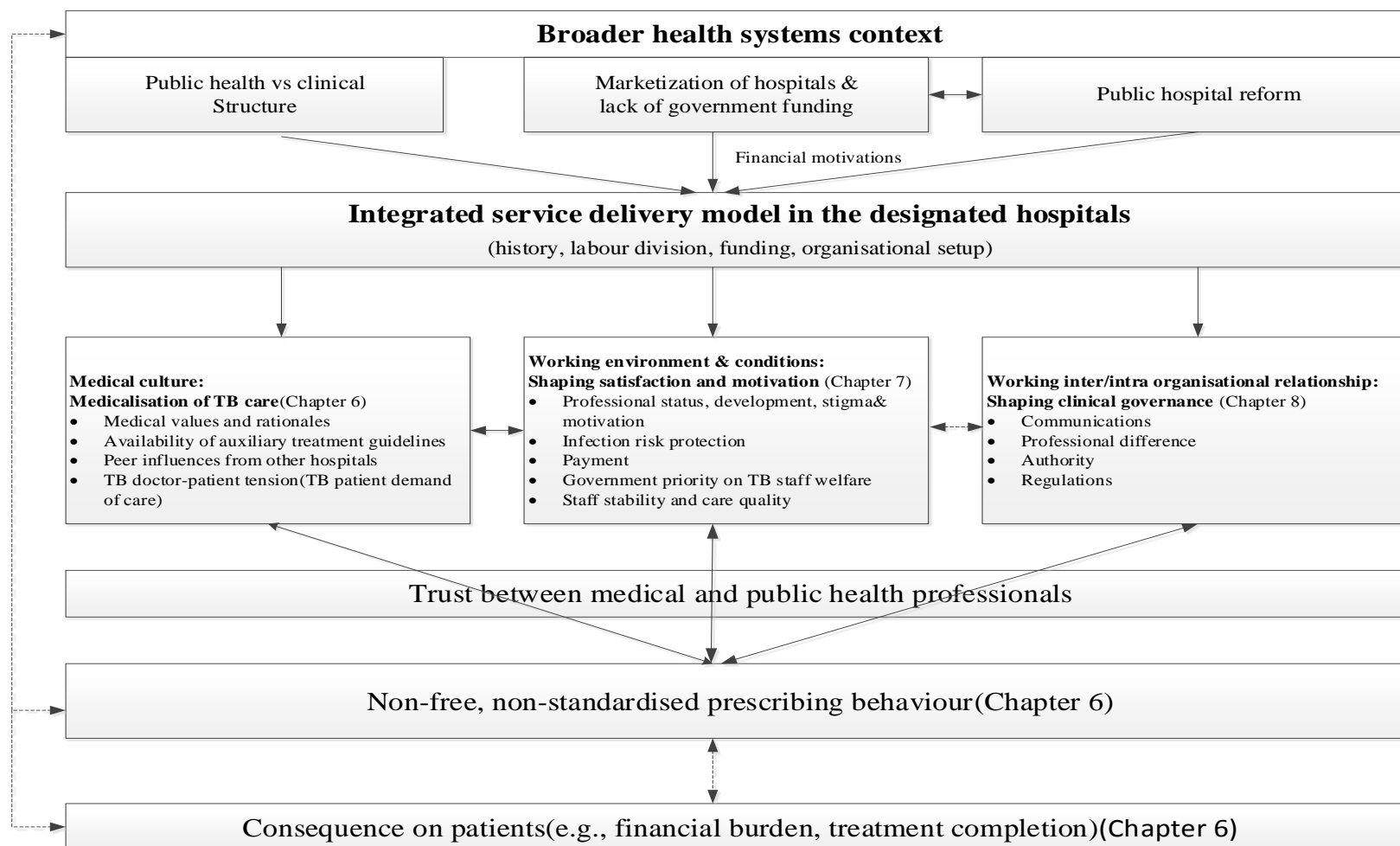
Figure 9.1 Casual loop diagram for integrated service delivery in the TB designated hospitals



Refinement of the systems-based thinking framework

At the outset of the study, a simple systems-based framework (Figure 3.1) was used to guide the study and depict the influence of health systems components on prescribing behaviour in the context of integrated service delivery. With on-going analysis and help of the CLD, this framework was extended and refined to illustrate the dynamic influences of the health systems components and processes on the providers' prescribing behaviour in the designated hospitals. The original framework proves useful in explaining providers' prescribing behaviour in the context of integrated service delivery in China, and has potential to be replicated for the evaluation of the integrated service delivery in other similar settings. However, this framework is too broad to capture the key health systems components and processes in the local context. The refined framework provides more locally-specific content and detail to elucidate the influences on prescribing behaviour (Figure 9.2).

Figure 9.2 Revised systems-based thinking framework to understand the integrated service delivery in the designated hospitals



Influenced by the concepts of health systems hardware and software, the systems-based thinking framework initially included governance (software), resources (hardware) and organisational culture (software). These components were elaborated as new themes emerged from the data analysis. Specifically, a number of unexpected software issues emerged as mediating hardware issues, e.g., priority of staff welfare shaping the working conditions; or being mediated by hardware issues, for example, job satisfaction and motivation being shaped by working conditions; or mediating among software issues, e.g., power relationships shaping the clinical governance.

While I originally understood the ‘governance’ block to comprise the leadership, guidelines and regulations related to service integration, the relationships between the health authority, public health and medical professionals, especially the tension between the public health and medical professionals emerged as a significant influence on the clinical governance of integrated service delivery. The framework started with broader exploration of ‘resource’ generation and management. However, issues related to information system and drug supplies did not emerge strongly to explain the prescribing behaviour of TB doctors. Rather, the workforce issues such as payment emerged strongly as important influences on the motivation and satisfaction of TB and infectious disease control health workers in the designated hospitals. In terms of organisational culture, medical culture and values were significant themes as I expected. With medicalised mental models, TB doctors highly medicalised the TB problem and provided strong medical rationales to treat TB. However, availability of auxiliary treatment guidelines, peer influences and doctor-patient relationships were emerging results that also explained the prescribing behaviour of the TB doctors.

Adopting CAS theory enabled elaboration of the software issues where the role of actors and human factors and interactions remain at the centre of the health systems. Therefore, this study advances knowledge on integrated service delivery within designated hospitals in China, a field where ‘hardware’ thinking has dominated most health systems studies. This study also contributes to other PPM-DOTS studies in

LMICs, which tend to consider the software issues, but not necessarily based on a CAS thinking framework.

Overall, the revised conceptual framework provides a dynamic and holistic understanding of the prescribing behaviour of the TB doctors in the context of integrated service delivery. Specifically, the non-standardised prescribing behaviour of the TB doctors can be seen as dynamic responses of health systems actors towards the conditions generated by the integrated service delivery. These conditions include the working environment and conditions, medicalisation of public health problems or 'medicalised mental models' with strong medical values of TB doctors, and inter/intra organisational relationships associated with the integrated service delivery. These conditions, shaped by broader health systems context, such as funding for public hospitals, divide between disease control and medical systems, doctor-patient relationships, have influences on the non-standardised prescribing behaviour of TB doctors.

For instance, poor working conditions and environment may influence the motivation and satisfaction of TB health workers, due to the perceived poor payment, poor risk protection and professional identity and development associated with poor attention from the government and hospital on welfare of the TB control staff in the hospital. This could result in non-standardised prescribing behaviour with increased non-standardised prescriptions. However, non-standardised practices may provide the TB doctors a means to gain back their self-perceived 'lost' professional identity.

Poor clinical governance of TB care can lead to the increased non-standardised prescribing behaviour of the TB doctors in the designated hospitals. This in return worsens the tension between public health and medical professionals, further compromising clinical governance. Other factors also contribute to the compromised clinical governance, such as poor authority due to the equalised administrative position between CDC and designated hospital, lack of clinical guidelines on auxiliary treatment and regulations on non-standardised TB treatment.

The medicalisation of public health problems (TB) in the context of service integration into the hospitals contribute to the non-standardised prescribing behaviour, which would strengthen the medicalisation of public health problem in the hospitals again. The degree of medicalisation should be mediated by the medical and public health values, availability of auxiliary treatment guidelines, peer influences and doctor-patient relationships in the designated hospitals.

Medicalisation of TB and motivation of TB health workers is linked as there is dynamic relationship between doctor-patient tension (which contributes to the medicalisation) and job motivation of TB health workers. Medical culture and values can shape the working relationship between public health and medical professionals and so the clinical governance of TB control in the designated hospital, while clinical governance can also shape the medical culture and values. The relationship between the clinical governance and working environment and conditions is weak from evidence of this study, but presumably there should be a binary relationship between these two components.

Trust between public health and medical professionals emerges strongly in the management of integrated service delivery. This should also be linked to the TB doctors' medicalisation of a public health issue and perceived poor working conditions and environment by TB health workers (as compared to the working conditions of the CDC public health officials).

Non-standardised prescribing behaviour of the TB doctors compromises the quality of TB care, causing the financial burden, and treatment non-completion of the TB patients, further damaging physician-patient relationships.

The broader health context also plays an important influence on the integrated service delivery. For instance, the tension between public health and medical professionals is not only due to the differences in the profession, but also embedded within the highly divided disease control and medical system in China. Lack of the government funding for general hospitals has not only shaped the doctor-patient relationship, but also led

to the income generation based bonus and welfare allocation culture and practice for TB health workers. This again demoralises the TB health workers due to their poor income generating ability as compared to other clinical professions in the hospital. The non-standardised prescribing behaviour and the associated consequences on the patients (e.g., financial burden, treatment adherence) is deeply rooted in the broader health systems contexts.

This framework suggests that influences from health systems components and processes on the prescribing behaviour of TB doctors are non-linear and dynamic in the context of integrated service delivery in the designated hospitals. However, this framework does not strongly capture the dynamic relationships between these three blocks of components and processes. Hereby, I have only meant to provide examples to articulate the framework refined through the course of the study. Further discussion of such dynamics will be embedded into the discussion of how the research questions are addressed based on this framework (Section 9.2).

9.1.3 Contribution to the literature on integrated TB service delivery

A number of themes have emerged such as medicalisation of public health care, motivation of health workers and clinical governance of the TB control in the hospital, and doctor-patient relationships. Most of these issues have not been previously discussed or given enough attention in the existing knowledge base on TB care within designated hospitals in China. A number of designated hospital studies in China identify over-treatment as a key problem associated with the integrated service delivery (Wei et al. 2014; Qiu et al. 2015; Hu et al. 2016; Huang et al. 2016; Jia et al. 2016; Zhou et al. 2016). However, most of the studies have underlined the financial incentives of the health providers as the key explanation for such problem. None of these studies have conceptualised this problem as the medicalisation of public health problems within the general health care setting. Specifically, this study explains how the overprescribing behaviour of the TB doctors is influenced by the medical culture and worsened by the lack of clear guidelines on the auxiliary treatment, deteriorated doctor-patient relationship, in addition to the financial pressures for cost recovery.

Previous studies have identified many factors that influence the motivation of health workers such as prestige and professionalism, physical constraints, lack of fairness, incentives, and commitment of managers to improve staff conditions and professional identity (Franco et al. 2002; Franco et al. 2004; Mbindyo et al. 2009; Helmink et al. 2012; Alhassan et al. 2013; Jegede 2013). However, similar discussion is limited in the setting of TB and infectious disease control in the LMICs, especially in the setting of integrated service delivery. The study adds to the existing knowledge of factors influencing the satisfaction and motivation of health workers. Through the analysis of working conditions and environment of the TB and infectious disease control workers in the designated hospitals, this study explains how these issues, including the perceived professional identity, development and discrimination have influenced their satisfaction and motivation in the context of integrated service delivery.

This study focuses on the working relationships between the Health Bureau, CDC and designated hospital, as well as the relationships within the hospital. It explains how the tensions and trust among the various actors especially the public health and medical professionals have arisen from the integrated service delivery, to influence the management of clinical prescribing behaviour of the TB doctors in designated hospitals. This adds to the existing international studies including the hospital-based DOT studies, which have identified power relationship and trust among the actors as key barriers to integration (Hurtig et al. 2002; Vyas et al. 2003; Newell et al. 2005; Kielmann et al. 2013; Engel and van Lente 2014).

9.2 Key issues of integrated TB service delivery

Based on the revised framework (Figure 4.2), this section discusses a number of key issues related to integrated service delivery that influence the prescribing behaviour of TB doctors in the designated hospitals.

9.2.1 Medicalisation of public health problem in the context of integrated service delivery

Integration aims to improve quality of TB care considering the clinical strength of the public hospitals. Consistent with previous studies (Wei et al. 2013a; Wei et al. 2013b;

Wei et al. 2014), this study suggests that the integrated model reduces systems delays and improves access to the DOTS facility for the TB patients. The designated hospitals remain the first contact of health service upon the onset of TB symptoms for most of the TB patients (62% vs 94% for Yongjia and Cangnan respectively). This proportion is even higher than that of another study from the same province, where only 28% of the TB patients firstly visited the TB designated hospitals (Wei et al. 2013b).

However, as the literature review in Chapter 2 suggests, integration may bring about unintended and negative consequences. This study suggests that TB care is highly medicalised in the context of integrated service delivery in the designated hospitals, with high rates of non-standardised and non-free prescribing for uncomplicated TB patients. Similar to other studies on TB designated hospitals (Jia et al. 2016), prescribing rate of CT for the outpatient TB patients is high in both sites (65% vs 89%). This rate is much higher than that in the CDC model (38%) and integrated model (34%) as found in another study (Wei et al. 2014). Prescribing rate of liver protection drugs is also high in both sites (35% vs 71%), though lower as compared to that in other designated hospitals (up to 80%) (Jia et al. 2016). Despite the nationally recommended use of the FDC anti-TB drugs, the non-free individual TB drugs are still prescribed in both sites (17% vs 16%). This study suggests that smear positive patients receive higher priority of auxiliary treatment for the non-free, first-line individual anti-TB drugs and liver protection drugs than smear negative patients do, especially in Yongjia. Further research is needed to explain whether this is related to the common perception that smear positive patients are more serious than the smear negative patients. Few studies mention the prescribing of immune improvement drugs, although this study presents high prescribing rates in the two sites (90% vs 33%). The hospital admission rate is also high for all types of the TB patients (20% vs 59%, see Chapter 5). However, the hospitalisation rate of uncomplicated TB patients is very low in this study (1.2% vs 8.9%). This is not consistent with the previous studies, which showed high admission rates of uncomplicated TB patients in the designated hospitals (15-83%)(Wei et al. 2014; Hu et al. 2016; Jia et al. 2016). Explaining this variance is difficult as it is unclear whether the two hospitals under study have more rigorous criteria for hospitalisation, or the patient selection criteria is more rigorous in this

study. Medicalisation of the public health problem is not only reflected in the prescribing of non-free, non-standardised diagnostic tests and drugs. This study also identifies the prolonged treatment duration in both sites, which goes beyond the WHO, and Chinese guidelines of six months for newly registered patients (8.1 months vs 6.7 months). This is similar to the finding of the hospital-based DOTS study in Indonesia, where the physicians will continue to treat TB patients with 'TB pattern' still existing on the X-ray at the end of continuation period (Probandari et al. 2008),

Consistent with previous studies (Chen et al. 2015; Qiu et al. 2015; Hu et al. 2016, Jia et al. 2016), this study suggests that non-standardised treatment contributes to the high financial burden of TB patients, especially the poor patients. This can be exacerbated by other factors such as delay (Wei et al. 2013a; Wei et al. 2014), transportation problem for rural residents due to the centralisation of TB care provision in China. Consistent with previous studies (Chen et al. 2015), this study reveals the potential non-compliance and dropouts of TB patients associated with the high financial burden due to the non-standardised treatment. This may not only compromise the continuity and quality of TB care but also reduce the trust of TB patients on the health providers due to the high financial cost of TB treatment. In particular, this adds to the challenges of management of migrant TB patients, who are more vulnerable to treatment non-completion, due to the high treatment costs and lack of health insurance where they live (Wei et al. 2009; Zou et al. 2013).

Integration exposes the TB practices in the hospital where the medical culture prevails. TB doctors prescribe according to their medical values or their medicalised 'mental models'. In this study, strong medical rationales are given to support the prescribing of the non-free, non-guideline recommended drugs and diagnostic tests. Similar to the other studies (Jia et al. 2016), the reported reasons ranged from using CT to improve TB diagnosis, using liver protection drugs and non-free individual TB drugs to prevent side effects of TB treatment, using immune improvement drugs to improve the immune ability of the TB patients and admitting patients to reduce TB transmission in the community. In a China-Gates study, the doctors in the designated hospital argued that it was difficult to address side effects caused by one or two anti-TB drugs when

FDC drugs were used, and they showed little trust in the effectiveness and quality of the free anti-TB drugs (Jia et al. 2016). These rationales reflect that TB doctors base their decision of treatment on the ‘core aspects’ of the treatment, related to the effects, side effects, co-medication, co-morbidity, or other characteristics of the treatment itself (Denig et al. 2002). However, some of these practices may not be necessarily evidence-based. As Liu et al. (2008) suggest, evidence base is rather poor to support the use of liver protection drugs during the TB treatment. There is even concern about the wide variety of compounds for their potential side-effects.

Standard treatment guidelines and protocols are of great importance for doctors’ treatment decisions (Denig et al. 2002). However, this study suggests that guidelines for auxiliary treatment remain ambiguous in the context of integrated service delivery. Lacking clear guidelines for TB treatment not only triggers the discussion of whether some ‘auxiliary’ drugs and diagnostic tests are rational (Jia et al. 2016), but also how and why international and national guidelines are applied and adapted locally. Without appropriate guidelines in place, TB doctors in the county designated hospitals ‘self-organise’ to adapt to environmental influences including weak doctor-patient relationships, faith in technological advancement to improve quality of care and peer influence from higher-level hospitals.

This study suggests that doctor-patient relationships have an importance influence on the clinical prescribing behavior of the TB doctors. This study adds to existing literature on doctor-patient relationships (Cai et al. 2011; Wu et al. 2012; Lancet 2014; Wu et al. 2014; Tucker et al. 2015), to depict how TB care is further medicalised in the context of integrated service delivery. As discussed in Chapter 6 (Section 6.2), poor communication between doctors and patients, misperception of free treatment policy and health insurance, and financial burden associated with over-treatment, have contributed to the tension between TB patients and health providers. In addition, the income generation based culture compromised the bonus, incentives and emphasis on protective measures of TB health workers (Section 9.2.2). Together with the perceived poor professional identity, these conditions demotivate health providers and reduce their job satisfaction, which in return worsens the doctor-patient relationships. As

pointed out in a Lancet article (2014), Chinese doctors are generally overloaded, with modest remuneration supported by the performance-based system that generates perverse incentives. Neglecting the interests of health workers may de-humanise both providers and patients, damaging a mutually rewarding doctor–patient relationship (Lancet 2014). As Chapter 6 suggests, however, further deterioration in doctor-patient relationships further reduces the motivation and satisfaction of the TB health workers (balancing feedback loop).

In the context of poor doctor-patient relationships, over-treatment has become a self-protecting mechanism and adaptive behavior of hospital providers, to satisfy the increasing demand of the patients and reduce the (concern of) potential medical disputes (Hu et al. 2016; Jia et al. 2016). This may reduce the non-standardised prescribing behavior of the TB doctors in return (balancing feedback loops). In addition, the tension between doctors and patients caused by the above mentioned factors will further increase the concern of the medical dispute to push doctors to prescribe more to patients (positive feedback loop). Integration itself may stimulate the patient demand of unnecessary services as the inpatient service and the advanced diagnostic tests such as CT are only available in the hospital, not in the CDC. However, among the various factors associated with the patient demand for unnecessary care, the role of health insurance schemes is worth attention. In China, health insurance schemes mainly cover the costs of the hospitalisation, with rather limited coverage for the outpatient services (Wei et al. 2014). This has induced high hospital admissions without appropriate insurance regulation in place (Hu et al. 2016; Jia et al. 2016). Pradhan et al. (2011) have also suggested the influence of TB patients’ demand on the prescription of non-RNTCP regimens in Maharashtra, India; however, this is mainly influenced by patients’ education and socioeconomic status.

On the other hand, patients’ perceptions and demands for advanced care services also coincides with the prevailing culture and beliefs among health providers that the advanced technology improves quality of care. This again suggests the prevalent medical culture among health providers and general public in China. Indeed, the non-standardised prescribing practices are universal in China. In particular, there appears

to be informal but authoritative influence from the higher-level hospitals. Unlike the TB programmes, hospitals in China do not have strict hierarchical or vertical system, as they are only subject to the leadership of the local Health Bureaus. However, not only the patients, but also the healthcare providers would deem the doctors at the higher level of hospitals as being 'more authoritative'. Spread of unstandardised practices can only be detrimental to the delivery of standardised care. In addition, this can lead to tension between the doctors and patients in the designated hospitals if patients' expectations are not met. On the other hand, this problem suggests the adaptive behavior of the TB doctors: without clear guidelines on the auxiliary treatment, TB doctors have to rely on the practices of their counterparts as their 'practice standards'.

Therefore, integration has led to the medicalisation of a public health problem in the designated hospital, which contributes to the non-standardised prescribing behaviour of the TB doctors in the designated hospitals. However, the more prevalent non-standardised prescribing practices, the more serious the medicalisation (positive feedback loop). The non-standardised prescribing behaviour of the TB doctors is also the resultant from the dynamic interactions between the medicalisation and other factors such as lack of clear guidelines, and poor doctor-patient relationships.

9.2.2 Influence of health systems financing and reform on motivation and satisfaction of TB health workers in the designated hospitals

Previous studies have shown that implementation of the zero-price markup policy reduced the drug revenues (Zhou et al. 2015b) and medicine to total charge proportion (Tian et al. 2016), but had not necessarily reduced the total hospital income (Zhou et al. 2015b). In this study, it is not possible to assess the impact of this policy on reducing the non-standardised prescriptions. However, despite the policy, this study still presents a high prescribing rate of the non-free auxiliary drugs that apply for the zero-price mark-up policy. Medicalisation of the public health problem can be a plausible explanation. However, this study also indicates the potential unintended consequence of this policy on the non-standardised prescription of medical examinations and hospital admissions. Loss of income due to free TB treatment policy

also remains a universal concern, not only in China (Zou et al. 2012), but also elsewhere (Probandari et al. 2011), where DOTS is being implemented in the hospitals. This triggers the pressure for cost recovery for the hospital providers as the free treatment policy does not cover the human resource and operational costs, and may even under estimate the service cost itself as per my communication with hospital providers. As Chapter 5 suggests, perverse incentives do exist among TB health providers. The very high hospital admission rate of all types of TB patients as reported in Chapter 5 may suggest the dynamic response of the providers to the policy in generating more income to cover the loss of income due to the implementation of zero price markup policy and free TB treatment policy. However, this study reveals more about the obvious problem of perverse incentives for the bonus of TB health workers than cost recovery for the hospitals.

In the context of market-orientated health services, there is a persistent lack of the government funding to cover the human resources and operational costs. As discussed in Chapter 5, the government funding for the hospitals has not significantly changed since the public hospital reform in 2009. In particular, there is also a neglect of financial input to providing TB services as ‘public goods’ in the hospitals. The recent public hospital reform attempts to reduce the financial incentives of the hospital. However, despite the new performance-based system that values the quality and quantity of services, in reality, income generation ability appears to determine the bonus allocation in reality, especially in Cangnan, which suggests the path dependency of bonus allocation as discussed in Chapter 7. For instance, in Yongjia, TB staff receive a fix bonus of 80% of the average bonus of the hospital staff, which is perceived to justify their potentially poor income generating ability. In Cangnan, the TB staff receive the bonus as other staff in the infectious disease control department, based on the performance-based system. In both cases, the bonus for the TB staff still relies on the total revenue of the hospital and/or department available for distribution. The system in Yongjia hospital appears to be better in reducing the financial pressures for the TB staff partly, since they receive the fixed bonus, and due to its independent setup and non-affiliation with the clinical departments that implement the performance-based system as with the case in Cangnan. However, as my earlier study

suggested (Zou et al. 2012), as long as the bonus system exists, and there is no sufficient input from the government to cover the health workers' payment and other operational costs of the newly integrated public health services, there continues to be pressure and distorted incentives to make profits from the patients.

However, the income-generation based culture of bonus allocation places TB and other infectious disease control staff into a financially vulnerable situation and creates the inter-departmental inequality of bonus allocation. Especially in Cangnan hospital, where the performance-based system is implemented for the infectious disease control department with which TB clinic is affiliated, TB staff receive less bonus due to its poor income generating ability. This is related to the nature of infectious diseases treatment that prioritises the use of drugs without profit mark-up. Staff could be further demotivated by the independent costing system, which deducts the operational cost (e.g. bills) from their departmental income. This is also worsened by the drug prescribing control policy that can easily result in staff bonus deduction.

The deep-seated idea that bonuses should be based on revenue generation clearly mediates against motivating maximisation of public good service delivery. Likewise, given the poor income generating ability of the TB control, it is unlikely for the hospital to prioritise other incentives and welfares such as risk protection and professional development in the hospital.

This study identifies the perceivably high infection and occupational health risk of working in the TB clinics, alongside the lack of risk assessment and protection, and infectious disease control incentives, which could have demotivated the TB health workers. In Cangnan, even the N95 respirator should be purchased by the infectious disease control department itself from its own departmental business income. Health protection, especially infection control to prevent nosocomial transmission and protect healthcare workers is under research for the Chinese designated hospitals. One larger scale study from Zhejiang province suggests that TB health workers are under the threat of TB infection, due to the poor infection control measures within the designated hospitals, such as the lack of regular monitoring of TB infection control in high-risk

areas (Chen et al. 2016). Similar barriers were also identified from other LMICs settings, including low supply of N95 particulate respirators (Buregyeya et al. 2013). Without addressing health system barriers such as lack of staff, space and funds (Buregyeya et al. 2013), implementing even relatively simple measures such as the availability of guidelines and training and support or correct N95 respirator use would be challenging (Brouwer et al. 2015).

This study suggests the perceived low professional identity, development and discrimination as a problem, especially in Yongjia. This may be related to the poor occupational protection, incentives and bonus they receive. However, the study provides other unexpected reasons such as working with poor and less-educated TB patients. While TB health workers had concerns about being discriminated against treating infectious diseases, many studies have suggested the social and cultural origin and influences of stigma for TB lie with TB control and treatment (Baral et al. 2007; Cremers et al. 2015). TB doctors are discouraged, due to the perceived under-estimation of their professional capacity owing to the simple nature of TB treatment, and poor professional development due to the restriction of treating TB only. This is similar to the case of PPM-DOTS in other LMICs, where some PPs are concerned about the lost professional status due to entering a partnership that may restrict their role as clinicians (Pradhan et al. 2011). In addition, this study suggests the lack of training for hospital TB providers from the public health facilities. However, due to the public health nature of the CDC, as well as the ambiguous TB guidelines, public health facilities may not be in a good position to provide clinical training (Chapter 8).

Therefore, issues related to poor payment, lack of health protection, poor professional identity reflect the poor attention of the hospital to the welfare of the TB health workers. This may also be due to the perceived low priority of TB control as compared to the HIV/AIDS control, where the HIV health workers receive better protection for political reasons. However, no studies are available that compare the investment and control and protection for HIV/AIDS and TB health workers in China. There is aOn the other hand, this study suggests the challenge and dilemma of balancing the interests and welfare between the TB and other clinical departments, despite the problems and

potential significance of TB control. Given the public health nature of the TB control work that only generates the minimum income for the hospital, it would be difficult to justify providing more benefits for the TB health workers in the hospitals where performance-based incentives prevail. This has contributed to the poor motivation and satisfaction of TB health workers thus influencing the stability of the TB health team. This study also suggests that staff shortage and heavy workload as perceived by the health workers compromise the public health and clinical aspects of TB care in the designated hospitals. The impact of staff shortage on quality of care was well documented (Hassmiller and Cozine 2006). However, it remains debatable about the reasonable workload and staff allocation in the context of integrated service delivery where both clinical and public health tasks are required for TB health workers.

In summary, despite the introduction of the new performance-based system that values quality of the service, with the lack of government funding for the newly integrated service, the income generation based culture for incentives allocation is the 'second-best' choice for the public good service delivery in the hospital. If the government wants to motivate and maximise the behaviours of public good(TB) service delivery, then it needs to find a way to measure and reward them.

9.2.3 Organisational structure and relationships: shaping the clinical governance of integrated service delivery

Integrating TB service in the hospitals raises a number of organizational debates and options: Should TB clinics be relatively independent, or affiliated with a clinical department such as infectious disease control or respiratory department of the hospital? In Chapter 5 (Section 5.2), I suggested that the choice of the organisational affiliation depends on the negotiation of the interest groups between the Health Bureau, CDC and hospitals. Yongjia CDC failed to establish the TB clinic in the infectious disease control department due to the strong resistance from that department, but ended up in setting up an independent TB clinic in the designated hospital. This model has presented certain strengths as compared to the 'staff rotating' TB clinic embedded within the infectious disease control department in Cangnan. For instance, the study shows that the independent TB clinic in Yongjia appears to be less medicalised, less

influenced by the economical incentives and presents a more stable workforce. However, their TB staff presents a stronger sense of professional inferiority and social stigma. This tends to indicate that health providers may react and adapt to the different organisational structure, resulting in the different organisational behaviour.

Brinkerhoff and Bossert (2013) provide a health governance framework to depict the governance relationships between the state and citizens, providers and citizens, state and providers in the health system. However, this framework limits the exploration of the relationship between and within the service providers. This study focuses on the dynamic relations among the actors involved with the integrated service delivery, between the health bureau, CDC and designated hospital; and within the hospital, between the TB clinic, public health department, and medical affairs department. In the CAS thinking, responsive actors constitute the complex social system like the 'clan' or 'network'. Social networks and relationships, through norms, values, trust and shared meaning, influence human behaviour (Gilson 2012a). In general, this study reflects the common challenges of providing public health care and providers' adherence to the standardised TB guidelines in the clinical settings. While TB service is integrated in the hospitals, public health workers and medical professionals try to maintain their professional status and mental models for TB control. Tension and mistrust between the public health and medical professionals thus arises in the clinical practices and management. As suggested by Chapters 6 and 8, the underlying professional ideology or mental models remain as the main source of tension. As revealed in other studies on the designated hospitals in China (Chen et al. 2015; Hu et al. 2016; Jia et al. 2016), the conflicts regarding population versus individual health and public benefits versus profited orientation dictate the relationships between the public health and medical professionals. While the views of both medical and public health professionals may be legitimate, there is a lack of mutual understanding and experience sharing of each other in practice, as other PPM-DOTS studies have suggested (Vyas et al. 2003). Similar situations are also found from the study of hospital and TB programme collaboration in Indonesia. These include different visions between the medical and TB programme staff; less confidence and perceived lack of power in medical supervision among TB programme staff; and TB programme staff

being looked down on and treated as ‘hospital nurses’ (Probandari et al. 2011). Other studies have also shown the professional tensions between TB programme staff and PPs, and physician’s mistrust of the diagnostic and treatment procedures in the public health-based DOTS (Hurtig et al. 2002; Vyas et al. 2003; Newell et al. 2005; Kielmann et al. 2013; Engel and van Lente 2014). These tensions can compromise the clinical governance, contributing to the non-free, non-standardised prescribing behavior (Balancing feedback loop).

In China, such tensions should not only be seen from the perspective of professional differences, but also within the highly divided health systems structure between public health and medical systems. Before the SARS epidemic in 2003, public health in China received very low priority while the hospital services have long been popular in a country with strong medical culture. Since the SARS epidemic in 2003, China has strengthened its public health systems nationwide (Wang et al. 2007). Public health institutions and staff have improved their professional and public health status with increased funding and infrastructural development. Public health institutions such as CDCs are classified as the public institutions, which aim to provide pure public good services. They normally receive full government funding but are not allowed to make profits from the services they provide. However, the public health development does not change the priority of the hospital development and the prevalent medical culture. The public hospitals continue to develop and expand rapidly, as described in Chapter 5. Although public hospitals are not fully funded by the government, the hospital staff have room for profit making, to receive better payment than the government salaried CDC staff. In the context of marketised health services (Blumenthal and Hsiao 2015), this may have contributed to the sense of professional superiority among the hospital staff.

In this study, the Health Bureau played an important role in steering integrated service delivery, especially at the initial period of the integration. There is a strong bureaucratic attitude of the health officials concerning the management of TB control in the hospital in Cangnan. However, the Health Bureau has delegated the responsibilities of daily management to the CDC in both counties. Although ostensibly

representing the Health Bureau, the CDC's supervisory authority is weak, for a number of reasons such as its equated administrative position with the hospital and lack of technical confidence as discussed in Chapter 8 (Section 8.1.2). This triggers the call for the strengthening of the administrative authority of the public health institutions, and even stronger involvement of the Health Bureau to improve the clinical governance of TB control in the integrated service delivery. As mentioned in Chapter 2 (Section 2.4.2), CAS does not exclude the hierarchy of the system. In many cases, healthcare system combines features from both organised (top-down) and self-organised (bottom up) systems. Health organisations are mostly self-organised and driven by their own interests (Tang et al. 2017). However, this does not change the hierarchically organised and regulated decision-making and supervision, especially in a country with strong, centralised, and hierarchical administrative system and public owned healthcare facilities (Zhang et al. 2014). On the other hand, based on the CAS theory, strong authority and control is not necessary, as this undermines the self-organizing and emerging capacity of the organisations. Leadership should instead focus less on prediction and control but more on fostering relationships and creating favourable and cooperative conditions for the integrated service delivery systems to evolve and produce creative outcomes. In this study, strong tension between the CDC and hospital indicates the lack of cooperative and mutual learning mechanism and platforms.

In some other LMIC context, rather than emphasising the role of health authority, an intermediary actor with sufficient power, places a key role in managing the partnership between the TB programme and the hospitals (Probandari et al. 2011), or between TB programme and private TB care providers (Hurtig et al. 2002; Rangan et al. 2004). While these experiences may not be fully applicable to the Chinese context, they suggest the importance of non-hierarchical, bottom-up approaches to the management of service integration. Hudson et al. (1999) suggested the importance of using personal relationships as a strategy for investing trust. In this study, informal communication and relationships emerge as important mechanisms for the daily management of the TB clinics in the designated hospital. However, over relying on the informal

communication may hinder the effective supervision of the CDC as the previous studies suggested (Zou et al. 2012; Zou et al. 2015).

This study raises the question as to what extent public health facilities should be involved with the management of integrated services in the hospital. There is a worrying tendency that TB control is ‘marginalised’ from the hospital management, due to the awkward position of the public health department, and weaker involvement of the medical affairs department in hospital TB control. This situation has led to the strong management involvement of the CDC with the TB clinic in the hospital. Over-involvement of the CDC in the hospital TB control may undermine the degree of integration and weaken the capacity of the management of the hospital. However, the global TB control experience has suggested that over integration of management functions in the hospitals resulted in the failure of TB control with deteriorated quality of case finding and treatment. This is because the hospital managers were not in a better position to provide technical management of the TB control in the hospital (Raviglione and Pio 2002). It is recommended that after TB service is integrated in the general hospitals, the TB control programme should remain as a strong actor in providing technical leadership and supervision in the TB control (Raviglione and Pio 2002). However, this study again suggests that the capacity of the CDC remains debatable in providing clinical leadership and guidance.

9.3 Limitations of the thesis

This was a case study conducted in two sites in China. As explained in Chapter 1, the study started with the aim of using systems-based(CAS) thinking to understand the influence of the funding models of the TB clinics on the prescribing behavior. However, as the research proceeded, this question was modified after the case study sites were selected and some data was collected. The case study site selection should have ideally been changed on the new research question. However, it was either too late or infeasible to change the research site considering the limited choices of designated hospitals which received earmarked government funding for the TB clinic and met with other inclusion criteria. However, this newly proposed question allows

for more open exploration of prescribing behaviour in the context of integrated service delivery, regardless of the sites selected.

The two counties under the same prefecture of Wenzhou have very similar economic development levels. However, many differences exist in addition to the funding models of the TB clinics, such as the population size, hospital scale and ratings and historical development of the hospitals. It is under exploration whether these factors also influence the prescribing behaviour, together with the other health systems components and processes as ‘confounding’ factors. For instance, in Yongjia, it is unclear whether and to what extent the GFATM project which was implemented before this study aiming to improve the quality of the newly integrated TB service has influenced on the health systems components and processes related to the integrated service delivery. It also remains under exploration whether and to what extent the international hospital accreditation which has helped to improve the TB clinic infrastructure has influenced on the motivation and satisfaction of the TB health workers in Cangnan hospital.

Experiences from the two sites should have limited generalisability within China. However, as discussed in Chapter 4 (Section 4.2.1), a case study approach does not aim for statistical generalization, but theoretical generalisation. Using the two hospitals as examples, this study illustrates the evolvement and refinement of a CAS based conceptual framework that may be useful for the explanation of the prescribing behaviour of TB doctors, in the context of integrated service delivery in China or other similar settings.

Within each hospital, only one or two doctors were practising in the TB clinics. While this again suggests the limited generalisability of the findings (provider behaviour), the literature review and my personal experiences suggest that the non-free, non-standardised prescribing practices are common in China. During the process of analysis and writing, attention was paid to ‘balance’ the account of the different cases/sites, and interviewees. In most cases, the similar questions were being explored with the same type of interviewees in the two sites. However, this does not necessarily

generate highly ‘balanced’ accounts between the two sites and different interviewees. However, the ‘emergence’ of certain issues in one site or certain interviewees may reflect the importance of that particular issue relevant to the specific site or interviewees.

This study only focuses on the prescribing behaviour of the TB doctors in the context of integrated service delivery. However, integration does not only involve the clinical aspect of TB care, but also public health functions of TB care such as case recording, reporting and tracing. However, the prescribing behaviour provides a valuable lens for studying the health system in China as overtreatment remains as one of the most important health systems problem in China, as discussed in Chapter 1.

In addition to the retrospective records review, this study mainly adopts semi-structured interview with limited observation activities during the field visits. I had originally planned to conduct observation of meetings, but this failed to happen due to the potential sensitivity of such activities and logistical reasons. Limited documents were collected due to the unavailability of the work reports, which indicated the poor management of integrated services. However, the limited documentary and observational data provided useful additional insights that could be triangulated with the interview data. For example, the phenomenon of poor doctor-patient relationships not only emerged from the interview, but was also observed during the field visits. However, this evidence is relatively weak with limited observations and mainly based on the interview from the health providers, although an increasing body of literature has reported this problem in China.

9.4 Implications for improving integrated TB service delivery

In this section, I will first discuss immediate programmatic implications for integrated service delivery in the TB designated hospitals in China, and then wider implications for integrated service delivery in other LMICs.

9.4.1 Implications for integrated service delivery in China

There are three main inter-connected areas to which this study can contribute to concerning improving integrated service delivery, and hence the prescribing behaviour of the TB doctors in the designated hospitals.

First, integrated service delivery could aim to reduce the over medicalisation of public health care in the designated hospitals. It is imperative to review the current guidelines for TB treatment, which are based on international guidelines. Given the popular use of some auxiliary treatments, such as liver protection drugs and immune improvement drugs, it is necessary to conduct larger-scale population studies to examine their efficacy in supporting TB treatment. It is also necessary to consider whether to replace the guideline-recommended X-ray with the CT, given the increasingly popular use of the CT, and bearing in mind the cost implications for the system and patients. While the views of both the public health and medical professionals are legitimate, it is important that public health values are integrated with routine medical practices in the designated hospitals. This could be achieved through more training on public health theories and practices among hospital providers. In addition, as other PPM-DOTS studies suggested, sending the staff from both sectors to work in each others setting can improve the mutual understanding of each profession (Vyas et al. 2003).

In the context of the weak doctor-patient relationships in China, the Health Bureau could aim to improve TB health workers' work attitude and communication skills with the patients. This could include skills to managing expectations and demands for health care among TB patients. The health bureau and the CDC could also aim to improve the education and awareness of the hospital staff about the free treatment policy for the TB patients as well as the benefit of the free treatment policy. Patients have the right to choose health care they can afford, but prescribing must be based on the principles of safety and effectiveness. Training of standardised TB treatment could be strengthened, not only for those working in the county designated hospitals, but also for those working in the non-designated hospitals, as this study suggests non-standardised practices can spread throughout the system.

Second, the government and hospitals could improve their attention to address the welfare and incentives of the TB health workers in the designated hospitals. The government could find a way of measuring and rewarding TB control work in the hospital, which could not be contingent on income generation ability. TB control work in the hospital would then have the chance of becoming more highly valued, reflected in improved professional status, payment and risk protection. Specifically, the payment and bonuses of the TB staff need to be re-evaluated to reflect their public health and social contribution. Occupational health measures could be improved and basic personal protective measures could be provided by the government rather than being purchased using their department business income. Infectious disease control incentives could also be improved to reflect the risk levels. The professional status of TB staff could be improved through enhanced developmental opportunities and training, e.g. sending TB health workers to practise in other general clinical departments for some time. However, this will again depend on the improvement of the working environment and conditions, and priority of TB control in the hospital, as well as the improved doctor-patient relationships. Ideally, additional funding should be given to the hospitals to support the newly integrated and other public health services. However, this depends on the local financial capacity and priority for TB control.

Third, it is imperative to improve the clinical governance of the integrated service delivery. It is important for the Health Bureau to clarify the roles and responsibilities of the partners, especially the clinical supervisory role of the public health professionals. These are particularly significant, when integrating an important public health function in the general hospitals presents ambiguous boundaries between public health and medical aspects of TB control. Responding to the concerns regarding ambiguous guidelines in providing auxiliary treatment, a TB clinical consultation committee including medical and public health experts of the hospital and CDC can be set up to guide and supervise the prescribing practices.

Trust building is challenging but essential: it is important to align the different cultures and values of diverse professionals, departments and institutions, and improve the sense of equality through regular contact, active dialogue. Further, regulations could be developed to include sanction and reward of implementing the standardised medical practices. However, this will also depend on the refinement of the clinical guidelines, regarding whether, and how, auxiliary treatment for TB could be used. The health authority could play an important role in coordinating and fostering the relationships between the CDC and hospital. The CDC could enhance its public health function and technical support and supervision to the designated hospital. The hospital itself could improve the ownership of TB control, and strengthen the awareness and practices of public good service delivery, multi-department collaboration and clinical supervision.

9.4.2 Implications for integrated service delivery in other LMICs

Although this study focuses on the clinical prescribing behavior of the hospital-based TB clinicians in China, findings from this study may inform discussions on integrated service delivery in other LMICs. As Chapter 3 suggests, providers' adherence to the diagnosis and treatment standards, especially regarding their ability to follow the diagnostic standards remain generally low in the PPM-DOTS, including hospital-based DOTS initiatives in other LMICs. Literature review also indicates the existence of over treatment behavior among the general health providers especially those working in the private sector.

Given the strong existence of professional differences and conflicts between the public sector NTPs and PPs, aligning the professional differences and relationships remain as an important agenda for the health authority, DOTS committee or NTP. This will ensure the quality and sustainability of the partnership in delivering the integrated service including for example, timely reporting, referral, or proper management of TB cases by general health care providers. This will also help to reduce the potential over medicalization of TB among private providers. While doctor-patient tensions are not often described in the international literature on TB, there is an indication of the influence of patient demand on the unstandardized prescribing practice among private providers. Intermediary organisations are commonly used to mediate the public private

collaboration in other LMICs; however, this may not be sustainable especially given some of these PPM-DOTS initiatives are research-led interventions. This study underlines the importance of introducing strong public sector governance in sustaining the public private collaboration in TB control.

The international literature has mainly reported PP's motivation to participate in PPM-DOTS partnership. This study provides some indications for NTPs on how to motivate PPs especially those based in the hospitals to deliver good quality of care, through increased attention to the occupational health protection, professional identity, development and payment. Although these issues do not emerge strongly from the current literature, they can be anticipated.

Finally, implementation of free TB care in the general health care settings may compromise the business and income of the PPs in other LMICs. It is important to prevent perverse incentives of PPs in TB care provision, while ensuring that PPs do not lose income and motivation in the implementation of PPM-DOTs.

9.5 Conclusion and possible avenue for further research

With nearly 70% of the counties having implemented this model in the country, China is currently strengthening the implementation of integrated service delivery model for TB control (Administrative Office of State Council, the Government of China 2017). Findings from this study suggest that delivering free and standardised integrated TB care in the designated hospitals is challenging in the context of highly fragmented disease control and clinical structures and market-orientated health services. Findings illuminate how health systems components and processes influence the prescribing behaviour of the TB doctors in the context of integrated service delivery in the designated hospitals in China. The study will inform the discussion of strengthening the quality of integrated service delivery model in terms of clinical governance, workforce and organizational culture in the TB designated hospitals. While public hospital reform aims to reduce the profit-orientated behaviour of the hospital providers, financial incentives are still relevant in the context of integrated service delivery. To improve the integrated service delivery system, strengthening the

hardware (building blocks) of the health systems through improving the evidence-based guidelines and funding to the hospital and the newly integrated TB service is critical but not sufficient. Efforts could also be made to address the software of the health systems, such as the conflicting values and trust building among the public health and medical health professionals. Health authorities could try to create an environment that fosters the cooperative relationship and mutual learning among the health systems actors.

The conceptual framework developed from this study can be further adapted, applied and tested in studies of evaluation of the integrated service delivery for TB and other disease control programmes in the similar contexts. Based on this conceptual framework and the casual loop diagram, systems dynamics modelling may be constructed to simulate the dynamic relationships among the factors influencing the non-standardised prescribing behaviour. Future research can provide more comprehensive pictures of integrated service delivery in the designated hospitals. For instance, studies can explore the health systems components and processes related to the delivery of public health aspect of TB care. More qualitative studies can be conducted to understand patients' pathways, experiences, and perceptions of quality of care within the TB clinics in the designated hospitals. Given that the organizational affiliation of the TB clinics presents certain patterns of the care delivery, larger scale studies can be conducted to explore its impact on the care delivery in the designated hospitals. Despite the change of research question for this thesis, I believe issues related to whether and how to fund the newly integrated TB services and the impact on care delivery in the designated hospital remains an interesting policy research question to be explored.

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Appendices

Appendix 2.1 Criteria and search strategy for empirical studies applying complex adaptive systems thinking in health service delivery studies in LMICs

Inclusion criteria

- Literature which applies systems thinking/complex adaptive systems theory in the evaluation of health service delivery
- English literature published in the recent two decades (2001-2017).
- Studies conducted in the low-to-middle-income countries.

Exclusion criteria

- Editorials or commentaries, building of conceptual models, dynamic models (without use of empirical data)
- Peripheral literature, for example
 - Literature which reports individual or population cohort studies (of a disease), and epidemiology, rather than implementation of public health policy or programme or interventions.
 - Literature which discusses peripheral topics, such as knowledge transfer, leadership development, health systems development, sustainability.
- Literature, which repeats, i.e. the same studies were published without significant changes.

English literature published from 2006 to 2017 was searched from the Medline, using the key words strategies, in appropriate combinations. The most relevant literature was identified by further examining the titles and abstracts. If these were not sufficient to judge for inclusion or exclusion, the full papers were downloaded and skimmed through. This list was then expanded by secondary searches of reference lists. The same procedures were repeated with Web of Science. Snowing balling approach from the reference lists of the selected papers was also used.

Key words for searching:

'system* thinking', 'system* theory', 'system* science', 'general system* theory', 'complex adaptive system*', 'complexity theory', 'open system*', 'systems analysis', 'system* dynamic*', 'feedback loop*', 'casual loop*', 'systems archetype*', 'stock and flow', 'process mapping', 'participatory impact pathways analysis', 'innovation history', 'change management', 'scenario planning', 'network analysis', 'social network analysis', 'agent-based modelling', 'punctuated equilibrium', 'path dependency', 'learning organization*', 'chaos theory', 'catastrophe theory', 'system* approach', 'holistic thinking'.

'disease control', 'tuberculosis', 'TB', 'infectious disease*', 'chronic disease*', 'non-communicable disease*', 'communicable disease*', 'health system*', 'health service*', 'service delivery', 'prescription', 'prescribing behaviour', 'hospital*', 'health care practice*'

Appendix 2.2 Summary of empirical studies on applying complex adaptive system in health service delivery research in LMICs

Title	Purpose	Country	Design	Methods	Key results
Yaya Bocoum et al. (2013)	To explore effects of task shifting for HIV in Burkina Faso	Burkina Faso	Case study	Qualitative research methods, document reviews, reviews of available data and records, interviews with key informants and health workers	Identified 20 possible effects of the strategy on the system as a whole. Importance of differentiating between two types of health systems effects: effects inherent to the task shifting strategy itself, such as job satisfaction; effects due to health system barriers, e.g. unavailability of medicines and supplies. Identified positive and negative unintended effects.
Agyepong et al. (2014)	To describe provider behaviour related to supply of health services to insured clients in Ghana, and explore the influence of provider payment methods on incentives and behaviour.	Ghana	policy evaluation	Grey and published literature reviews, health management information system and primary data collection (in-depth interviews, observations of time spent obtaining service, prescription analysis, and exit interviews with clients	The influence of provider payment method on supply behaviour was non-linear, influenced by the context and the interaction of the methods with context and each other.

Paina et al. (2014)	To describe the complex patterns of the evolution of dual practice in Uganda, and the responses of the local management practices in five government facilities	Uganda	Multiple case study design	Interviews with policy stakeholders and a review of historical and policy documents	Dual practice arose from the complementary public and private sector incentives, non-financial and financial. Local management practices differed from the health manager's attitude towards and personal experience with dual practice.
Varghese et al. (2014)	To understand and explain the phenomena underlying unexpected changes in vaccination coverage in India	India	Qualitative case study	Literature and document review, in-depth interviews, focus group discussions and observations of immunisation service	Trust in health workers and institutions shaped the interactions of actors, resulting in complex adaptive system phenomena. This influenced the change in vaccination coverage levels.
Ager et al. (2015)	To identify key pathways of threat to provision and emerging pathways of response and adaptation in the conflict affected areas in Nigeria	Nigeria	Service evaluation	Interviews and group model building session	Many interacting factor contributed to the key pathways of threat (e.g. insecurity) and adaptation (e.g. political will) with regard to health service functioning .

Bozzani et al. (2015)	To conduct situation analysis of the eye health system and assess VISION 2020 process indicators on human resources, equipment and infrastructure in Zambia	Zambia	Policy evaluation	Survey, key informants interview, policy papers review	Root causes of underperformance in the Zambian eye health system: shortage and misdistribution of human resources, lack of routine monitoring and inadequate financing mechanisms. All these hindered the ability to achieve the VISION 2020 goals.
Topp et al. (2015)	To examine the impact of HIV scale-up on mechanisms of accountability in primary health facilities in Zambia.	Zambia	Multi-case study	Provider interviews; patient interviews, direct observation of facility operations and key informant interviews	Within the four ART departments: some early gains in administrative answerability due to resource-intensive investment in HIV services. In the wider health centres, mechanisms of administrative accountability remained weak; elusive gains in social accountability
Zhou et al. (2015)	To assess the effectiveness of public health services delivery under the contract service policy, explore the mechanism of influence.	China	Multiple-case study	Document analysis, non-participant observation and interviews (including key informant interview and focus group interview)	Health bureau was the most crucial actor among the complex public health systems. Their mental models contributed to the diverse outcomes, as influenced by the compound and various environments around them.

Zou et al. (2015)	To analyse the barriers to hospital and TB programme collaboration in China	China	Policy evaluation	In-depth interview	Reporting and referral and non-standardised prescriptions and hospitalisation by the general hospitals remained a problem. Health systems contextual issues challenged the TB programme and general hospital collaboration.
Barasa et al. (2016)	To examine priority setting and resource allocation (PSRA) practices in 2 public hospitals in coastal Kenya	Kenya	Two-case study	In-depth interviews of national level policy makers, hospital managers, and frontline practitioners	Existence of properties of complex adaptive systems (CASs) with multiple interacting agents. Emergence of undesired properties due to weaknesses in system 'hardware' (resource scarcity) and 'software' (e.g. reduced hospitals decision space, and poor leadership skills due to PSRA guidelines.
<u>Mutale</u> et al. (2017)	To report the system-wide effects of a complex health system intervention aimed at improving service quality in Zambia - Better Health Outcome through Mentorship and Assessment (BHOMA)	Zambia	In-depth interviews and focus group discussions	Post-intervention evaluation	Community responded positively to the BHOMA intervention. In the short term demand for services increased but the health worker capacity was not severely affected. Unintended consequences occurred during the implementation of the BHOMA.

Tang et al. (2017)	To analyse the failure of the reform of a Chinese Regional Integrated Healthcare Organisation	China	Case study	Questionnaires and interviews	The effect of the reform was not desired. The Qianjiang IHO was loosely integrated, with low cooperation levels between organisations and professionals.
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Appendix 3.1 Criteria and search strategy for PPM-DOTS studies in LMICs

Two databases, i.e. Medline and Web of Science were searched, using the key words and combined strategy. The author assessed the relevance of the studies by reviewing the titles, and the abstracts if the titles were not clear enough to make the judgment. The selection criteria were empirical studies, which included the discussion of the health system components in the context of integrated TB service delivery; studies conducted in low-to-middle income countries; English journal articles published between 2000 and Feb of 2017. This means that many literatures, which only report the clinical and laboratory outcomes of PPM-DOTS without or with weak discussion on the health systems components, were excluded. A snowballing approach was also used to identify and supplement the literature by screening the reference list of the selected papers.

Key words for searching

- TB, 'tuberculosis', 'pulmonary tuberculosis', 'pulmonary TB', 'Mycobacterium tuberculosis', 'M tuberculosis'
- 'integration', 'collaboration', 'coordination', 'cooperation', 'service integration', 'integrated service*', 'integrated service delivery', 'horizontal', 'health system*', 'health care system*', 'health service*', 'health care', 'PPM-DOTS', 'public-private sector partnership*', 'public-private mix', 'public-private collaboration', 'public-public collaboration', 'public-public mix', 'hospital-DOTS', 'public sector', 'private sector', 'public provider*', 'private hospital*', 'public hospital*', 'general hospital*', 'hospital*'

Appendix 3.2 Summary of the PPM-DOTS studies in LMICs (excluding China)

Authors	Country	Purpose	Study design	Method	Key results
Hurtig et al. (2002)	Nepal	To presents a pilot service-linkage project between the public and private sector in TB control in Kathmandu Valley, Nepal.	Longitudinal analytical case study	Project formulation to a short-term evaluation	Capacity, motivation, environment and needs varied among involved organizations influenced short-term success of the project. Lack of structure or resource of public sector to engage with private sectors and poor trust of private sector in public sector.
Vyas et al. (2003)	India	To quantify perceptions held by each private and public practitioners in Gujarat, India.	Cross-sectional survey	Questionnaire survey	Significant conflicts existed in perceptions (e.g. attitudes towards each sector and effectiveness and social implications of DOTS), which might lead to mistrust, unwillingness to cooperate, etc.
Lönnroth et al. (2004)	India, Kenya	To compare processes and outcomes of four PPM-DOTS	Cross-project analysis of secondary data from separate project evaluations	Semi-structured interviews	Success depends on strong NTP commitment to supporting, supervising and evaluating PPM projects; use of non-government organizations as intermediaries; sufficient dialogue.

Rangan et al. (2004)	India	To develop a model partnership between rural private practitioners and the revised national RNTCP	Participatory research methods	Quantitative (process and outcome indicators) and qualitative (observation) research methods	Referral decreased and communication and documentation discontinued. Importance of organisational and individual commitment to partnerships; important roles of the District Health and TB Officers and NGOs.
Newell et al. (2005)	Nepal	To describe and discuss leadership, management and technical lessons learnt from the successful implementation of PPM for TB control in Nepal		Informal interviews with partnership stakeholders	Slow and demoralising process of partnership building, though with increased involvement and commitment to the PPP from perseverance partners. Leadership is key.
De Costa et al. (2008)	India	To study willingness and motivation of private providers (with various qualifications) to collaborate in Ujjain District, India	Cross-sectional sample survey		All providers were willing to collaborate, with urban-rural difference in the areas for collaboration. Main motivation: altruism and an opportunity to collaborate with the government; under exploitation of enthusiasm in the private by the RNTCP.
Sinanovic and Kumaranayake (2010)	South Africa	To examine the motivations for participation in existing and potential		Semi-structured interviews	Private providers have financial and non-financial motivation in participation. Competition, social and political framework key to achieve a successful partnership.

		models of PPP-DPTS in South Africa			
Pradhan et al. (2011)	India	To examine factors accounting for the sustainability of a PPM-DOTS in Maharashtra, India	Intervention evaluation	In-depth and semi-structured interviews	Private sector's contribution to case detection and treatment success increased, but challenges existed, including referral, non-programme prescription, failing to report default etc.
Naqvi et al. (2012)	Pakistan	To assess a PPM-DOTS that aimed to strengthen the capacity of general practitioners (GPs) in providing TB treatment through DOTS;	Quasi-experimental study	Analysis of TB register and TB forms	No systematic list of GPs available; most of the GPs untrained; low motivation of GPs with high patient loads; and difficult access to a laboratory. High treatment success.
Daboer et al. (2013)	Nigeria	To assess the level of implementation in Jos, Plateau State	Facility-based, cross sectional study	Structured questionnaires	The ratio of supervised facilities is low. Still 40% facilities do not treat TB according to DOTS.
Kielmann et al. (2013)	India	To examine the roles of tuberculosis health visitors (TB HVs) in mediating working relationships among private providers, programme staff and patients in a PPM-		Observations and informal interactions, in-depth interviews	TB HVs are at the centre of multi-actor relationships, but not valued partly due to the technically rather than social outcomes based accountability measurement in the 'partnership'

		DOTS in western Maharashtra			
Engel and van Lente (2014)	India	To investigate the causes of difficulties in implementing PPM initiatives as cases of organisational innovation	Qualitative and exploratory	Semi-structured interviews, observations and document analysis	Underlying problem definitions and control practices (i.e. supervision, standardisation and culture), continued to clash preventing the scaling up of PPM.

Appendix 3.3 Summary of the hospital-based DOTS studies in LMICs (excluding China)

Authors	Country	Purpose	Study design	Methods	Key findings
Murthy et al. (2001)	India	To determine whether private practitioners and the government can collaborate with a non-governmental intermediary to implement DOTS effectively.	Intervention evaluation	Routine data collection, patient survey	An institution such as a non-profit hospital can serve as an effective intermediary. PPM achieved good case detection and high rates of treatment success. Financially more accessible for patients. Clearly defined roles and expectations and frequent communication need for PPM.
Irawati et al. (2007)	Indonesia	To develop a model for public-private partnership through DOTS expansion into public and private hospitals in Indonesia	Intervention evaluation		Increased case detection. Hospitals has a lower cure and success rate than that of health centers and clinics. stakeholder-based provincial coordinating (DOTS) committee as the recognized interface between NTP and providers
Probandari et al. (2008).	Indonesia	To assess quality in implementing DOTS strategy in hospitals in Indonesia	Multiple-case study	Self-administered questionnaires, focus group discussions, interviews, observation and documents.	Importance of process, i.e. mainly commitment and case holding process, to the treatment outcome.

Probandari et al. (2010)	Indonesia	To estimate the proportion of outpatient adult TB patients in the hospitals involved in the PPM-DOTS strategy receiving DOTS diagnosis and treatment	cross-sectional study		A substantial proportion of TB patients cared for at PPM-DOTS hospitals are not diagnosed and managed under the DOTS strategy
Probandari et al. (2011)	Indonesia	To explores local actors' views and experiences of the process of PPP in delivering TB care in hospitals in Indonesia.	qualitative research design	In-depth interview	Strategies, power and interactions between actors are important for partnership, and good governance makes partnership effective and sustainable
Ifibunandu and Ukwaja (2012)	Nigeria	To determine the prevalence, trend, timing and predictors of defaulting from tuberculosis treatment in a Nigerian tertiary hospital	statistical analysis		Nearly 30% defaulted during treatment; most defaulted during their intensive phase of treatment; median default time was 7 weeks.

Appendix 3.4 Summary of the hospital-based DOTS studies in China

Authors	Purpose	Study design	Method	Key findings
Sun et al. (2013)	To investigate the quality of TB care in the integrated approach and in the dispensary approach	Programme evaluation	Patient questionnaire survey	Integrated model showed a better quality of TB care with shorter health systems delay and lower expenditure than dispensary model. Designated hospitals also had fewer patients using second-line TB drugs than TB dispensary.
Zou et al. (2012)	To explore the factors that influence the integration of TB services in general hospitals and generate knowledge to aid the scale-up of integration of TB services in China.	Programme evaluation	Qualitative interviews	The more prosperous site in East China and the poorer site in the West shared similarities and differences in terms of coordination, resource allocation and patient-orientated service, motivation for integration, etc.
Wei et al. (2013a)	To compare patient care seeking pathways under the three models, and to provide policy recommendation for the TB control system reform in China.		Patient survey	integrated model presented the simplest care seeking pathways, with the least number of providers visited (2.2), shortest treatment delays (2 days) and the least medical expenditure (2729RMB/401USD)
Wei et al. (2013b)	To report care pathways of TB		Patient survey	the integrated model had relatively fewer patient pathways and shorter delays than

	patients and to provide policy recommendations for TB care reforms			the dispensary model but did not reduce patient out-of-pocket costs
Wei et al. (2014)	To compare effect of three hospital and TB collaboration models in China	Programme evaluation	Patient questionnaire survey, patient chart review	Serious financial expenditure and a high level of deviation from national guidelines in all sites, possibly related to the profit-seeking behavior of public hospitals. Integrated model had fewer unnecessary hospitalisation and use of second-line TB drugs
Chen et al. (2015)	To explore the reason that TB patients in China face barriers in seeking diagnosis and treatment	cross-sectional mixed method	Patient questionnaire survey, interviews, focus group discussions	More than half had catastrophic health expenditure. Patients who perceived high economic burden relating to TB treatment, who had high costs for transportation, lodging and food were more likely to report non-compliance.
Li et al. (2016)	To evaluate non-medical costs induced by seeking TB care	cross-sectional study	Survey, interviews	Non-medical costs relating to TB treatment are a serious financial burden for many TB patients. 20 % reported catastrophic expenditure on non-medical costs.
Qiu et al. (2015)	To describes the economic burden on patients with tuberculosis		Patient survey	High treatment cost and burden. Out of pocket payment related to diagnosis delay, hospitalization, intake of liver

				protective drugs and use of the second-line drugs.
Hu et al. (2016)	To better understand the TB patient admission rate and TB inpatient service cost and their influential factors in this new model.		Patient survey, interviews, focus group, documentary review	Qualitative analyses: financial incentives, misunderstanding of infectious disease control and failure of health insurance regulations key to admission rates and medical costs. Quantitative analyses: differences in hospitalization rate among patients with different health insurance and patients from different counties.
Jia, et al. (2016)	To examine whether or not TB designated hospitals in the selected project sites have provided TB care according to the national and local guidelines and associated the practices and spending	mixed methods	surveys, qualitative interviews, medical records review, guideline review	Failure of 'free' TB care policy. Substantial spending on non-recommended services, examinations, and drugs for TB treatment.
Xiang et al. (2016)	To evaluate changes in catastrophic health expenditure (CHE) caused by the reimbursement policies.		Patient surveys, focus group discussion	Effective reimbursement rate of inpatient costs for TB patients 57% and very low for outpatient costs. Low reimbursement associated with heavy financial burden. NCMS had the modest impact on the severity of CHE.

Zhou et al. (2016)	To assess the incidence, intensity and determinants of catastrophic health expenditure (CHE) relating to TB care in China.		Patient survey	Nearly 70% had CHE using the household income measure and 55% using non-food expenditure). Significant determinants of CHE related to health insurance status, patient income as a percentage of total household income, hospitalization etc.
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Appendix 4.1 Example of background interview topic guides

1. How long have you been working in this hospital? What has been changing in the last 10 years(in line of TB care)?
2. Is the public hospital reform on-going in this hospital? Any other major policy change? Any influence on the TB control work in the hospital?
3. Why did you adopt the designated hospital approach? What do you understand by designated hospitals? Can you explain its implications on the service delivery of TB care?
4. How TB care is funded in this hospital? How TB care is cross-subsidized from other medical services?
5. Can you explain the funding mechanism for TB care in this hospital? Why was this funding mechanism adopted? Can you explain its implications on delivery of TB care in the hospital? How do you feel about it?
6. Do you have any performance appraisal system for the TB work in the hospital? Who will decide whether to fund the hospital TB work? What factors will be taken into account for such decision?
7. Do you think this funding mechanism is sustainable? Why/why not?
8. What do you think will happen to this kind of funding mechanism in the next decade?

Appendix 4.2 Screening questionnaire for the government funding support on TB clinics of the TB designated hospital

County:_____Completed by:_____

Does the TB clinic in your hospital receive special funding from the government (health bureau, CDC or financial bureau)?

Yes____No____[Please note that the specific funding does not include the ROUTINE TB supplies and drugs covered by the free treatment policy]

If No, no need to continue the following forms.

If yes, please **continue** to complete the following form.

Sources of funding TB clinics in the designated hospital

Total government funding on TB services_____

Among which

-TB supplies and drugs covered by the free treatment policy_____

-Special government funding for TB clinics_____ what is purpose of this funding?

Total TB service revenues (including from health insurance and out-of-pocket payment)

Does the TB clinic have other sources of income? If yes, what are they_____

General information on the designated hospital

Number of staff in the hospital_____

Number of staff in the TB clinic_____

Among which, number of

-Clinical doctors_____

-Nurses_____

-Pharmacists_____

-Laboratory technicians_____

-Radiologists_____

Total revenues of the hospital_____

Among which

-government input on the hospital_____

-service revenues_____

-other income_____

Setup time of the TB clinics

TB information

Prevalence of TB_____

Notification rate _____

Cure rate_____

Social-economic, and demographic background of the county

Geography (plain or mountain) _____

Population_____

Per capita GDP_____

Per capita health expenditure_____

Government input on health, as a proportion of the GDP_____

Distribution of health facilities_____

Appendix 4.3 TB patient chart review of TB designated hospital

1	Registration Number:		
2	Type of patients 1) smear positive 2) smear negative		
3	Treatment protocol:		
4	Months of treatment:		
5	All the examination items and quantities during the whole TB treatment (only fill the one which is not for free):	Examination items	Quantities
		Sputum smear	
		Sputum culture	
		X-ray	
		CT	
		Liver function test	
		HB test	
		Renal function test	
		Blood routine test	
		Urine routine test	
		Blood biochemistry test	
		PCO	
		ESR	
		ECG	
6	Name and dosage of drugs prescribed during the whole TB treatment (only fill in those not covered by free treatment policy)	Drugs	Dosage
7	Reason for stop treatment: ①cured; ②complete treatment; ③others		
8	Total medical cost (Yuan)		
	Including: registration fee		
	Examination cost		
	Drug cost		
9	Reimbursement by health insurance (Yuan)		

Appendix 4.4 Examples of interview topic guides

Example of topic guides for managerial type of interview

[Interview topic guide for vice director of County CDC (responsible for TB control)]
Profile

Can you please tell me a little about your background? (Probe: qualification, and years of experience; specific expertise in TB)

- How long have you worked in the CDC (and worked with TB)?
- What are your main responsibilities? (list areas)
- Can you tell me roughly, how much time you spend per week on these areas? (for each area listed)

Roles and responsibilities/division of labor

- What does the model of designated hospital mean for your responsibilities? And for the division of labor? (probe: for the distribution of tasks and duties among staff responsible for TB services)
- Can you describe the changes in your responsibilities since TB integration? Can you describe any changes in your workload since TB integration?

Clinical management

- Can you comment on the clinical management procedures as compared with managing TB at the TB dispensary? (Probe: resources, procedures, guidelines, quality control)
- We have had the opportunity to review about 200 patient charts. Could you comment on why doctors prescribe those drugs and examinations?
 - Non-free drugs, i.e., first-line anti-TB drugs, liver protection drug, regulating immune medicine, gastrointestinal medicine and antibiotics
 - CT, liver function and hepatitis test and others
 - Hospitalization

Organizational culture

- What does integration mean for communication across the staff responsible for TB services? How do you communicate with the hospital managers, health bureau and county government? How often?
- How do you feel about ownership of the program?
- What is the place of TB/designated hospital work among all the CDC work?
- Do you have regular meetings?
- How do the health bureau/county government respond if TB control/designated hospital, work has difficulty? Can you give me an example? Are there examples of activities to promote teamwork?
- How do you supervise designated hospital's work in TB? Can you give me an example? Do you think if it is effective not?
- What scale of attention do you receive from higher authorities (county government and health bureau, Ranking:1-5)? What are the top 3 priorities in the county level's health agenda? Please explain – how and where is this reflected.

Resources

- What does this TB integration mean for resources, eg, human resource, infrastructure? Can you comment on the salary/ income structure of the designated hospital staff? as well as the human resource structure? Any preferential policy for the TB clinic and public health staff in the designated hospital?
- Do you feel the designated hospital has adequate staff to manage TB here?
- How about TB drugs and equipment? How are they purchased? Are there any problems? Do you think TB staff have adequate resources to use? Can you give me example of resource constraints? How does this influence clinical practice?

OVERALL – IN SUMMARY:

- What major challenges in managing TB in the designated hospital? What do you think about designated hospital work vs. TB dispensary?
- What do you think are the main challenges for staff and patients?
- What are the main advantages of this approach for staff? for patients?
- Do you have any suggestions for the future designated hospital TB work?
- What would improve your satisfaction working as X here to you?

[Interview topic guide for vice director of the designated hospital (responsible for TB control)]

Profile

Can you please tell me a little about your background? (Probe: qualification, and years of experience; specific expertise in TB)

- How long have you worked in the designated hospital?
- What are your main responsibilities? (list areas)
- Can you tell me roughly, how much time you spend per week on these areas? (for each area listed)

Roles and responsibilities/division of labor

- What does the model of designated hospital mean for your responsibilities? And for the division of labor? (probe: for the distribution of tasks and duties among staff responsible for TB services)
- Can you describe the changes in your responsibilities since TB integration? Can you describe the changes in your workload since TB integration?

Organizational culture

- What does it mean for communication across the staff responsible for TB services? How do you communicate with the CDC, health bureau and county government? How often?
- What is the place of TB/designated hospital work among all the hospital work? How do you feel about ownership of the programme? Do you have regular meetings?
- How does the health bureau/county government/CDC respond if TB control/designated hospital work has difficulty? Can you give me an example? Are there examples of activities to promote teamwork?

- Who supervise the work of designated hospital? How? Can you give me an example? Do you think if it is effective not?
- What scale of attention do you receive from higher authorities (county government, health bureau and CDC Ranking:1-5)? What are the top 3 priorities in the county level's health agenda? Please explain – how and where is this reflected.

Resources

- Can you comment on the salary/ income structure of the designated hospital staff? as well as the human resource structure? Any preferential policy for the TB clinic and public health staff in the designated hospital?
- Do you feel the designated hospital has adequate staff to manage TB here?
- How about TB drugs and equipment? How are they purchased? Are there any problems? Do you think TB staff have adequate resources to use? Can you give me example of resource constraints? How does this influence clinical practice?

Clinical management

- Can you comment on the clinical management procedures as compared with managing TB at the TB dispensary? (Probe: resources, procedures, guidelines, quality control)
- We have the opportunity to review 200 patient charts. Could you comment on why doctors prescribe those drugs and examinations?
 - Non-free drugs, i.e., first-line anti-TB drugs, liver protection drug, regulating immune medicine, gastrointestinal medicine and antibiotics
 - CT, liver function and hepatitis test and others
 - hospitalization

OVERALL – IN SUMMARY:

- What are the major challenges in managing TB in the designated hospital? What do you think about designated hospital work vs. TB dispensary?
- What do you think are the main challenges for staff and patients?
- What are the main advantages of this approach for staff?...for patients?
- Do you have any suggestions for the future designated hospital TB work?
- What would improve your satisfaction to you?

Example of topic guides for practice type of interview

[Interview topic guide for TB clinical doctor]

Profile

Can you please tell me a little about your background? (Probe: name, gender, qualification, and years of experience; specific expertise in TB)

- How long have you worked in this clinic?
- What are your main responsibilities in this clinic? (list areas)
- Can you tell me roughly, how much time you spend per week on these areas? (for each area listed)

- Did you receive specific training on TB services? If so, when? For how long? Can you recall up to 3 main issues that were the focus of the training?

Roles and responsibilities/division of labor under designated hospital

- When did you hear about the designated hospital/integration? How did you respond (what was your reaction?)?
- What does the model of designated hospital mean for your responsibilities? And for the division of labor?
- Can you describe the changes in your responsibilities since TB integration? Can you describe the workload since TB integration?

Organizational culture

- What does it mean for communication across the staff responsible for TB services? How do you communicate with the hospital managers? How do you communicate with public health department, infectious disease department, and other staffs (CDC staff)? How do the hospital leaders respond if your department has difficulty? Can you give me an example? Are there examples of activities to promote teamwork?
- Who supervises your work? How are you supervised? Do you think if it is effective not?
- What motivates you in your work? What demotivates you?
- What scale of attention do you receive from higher authorities (hospital directors, health bureau, CDC)? Please explain – how and where is this reflected.
- What are the top 3 priorities in the hospital? How is reflected in TB clinic? How do you feel about ownership of the program? Do you have regular meetings?

Resources

- Can you tell me about the salary/ income structure? How does the hospital allocate the salary and bonus for TB clinic staff and yourself? What is operational mode of TB clinic staff (rotation, temporary...)? Any preferential policy for TB clinic and public health staff?
- Do you feel there are adequate staff to manage TB here?
- How about TB drugs and equipment? How are they purchased? Are there any problems? Do you have adequate resources? Can you give me example of resource constraints? How does this influence clinical practice?

Clinical management

- What are the main differences in clinical management procedures as compared with managing TB at the TB dispensary? (Probe: resources, procedures, guidelines, quality control)
- Who do you work closely with in managing patient? When is there a need to communicate with other staff involved in management of the patient e.g. nurse, pharmacists, lab technician?
- How do you communicate with them? Can you give me a recent example of a patient where you had to confer with others regarding management?
- We had the opportunities to reviewed 200 patient charts – the data showed x and y. Could you comment on why doctors prescribe the drugs and examinations as below?

- Non-free drugs, i.e., first-line anti-TB drugs, liver protection drug, regulating immune medicine, gastrointestinal medicine and antibiotics
- CT, liver function and hepatitis test and others
- hospitalization

OVERALL – IN SUMMARY:

- What major challenges in managing TB in this hospital? What do you think designated hospital work vs. TB dispensary?
- What do you think are the main challenges for staff and patients?
- What are the main advantages of this approach for staff?for patients?
- Do you have any suggestions for the future designated hospital TB work?
- What would improve your job satisfaction to you?

Appendix 5.1 Profiles of the two hospitals in Yongjia and Cangnan

	Yongjia	Cangnan
Size/space	29,200 square meters	30,000 square meters
Functions	Medical care, emergency, rehabilitation, teaching, research and preventive health care. Host the quality control centres of the clinical medicine, nursing, testing, radiation, hospital infection, pharmaceutical and others in the county; and was the designated cataract operation hospital in the county.	Medical treatment, health, rehabilitation, research and teaching.
Key departments/disciplines	Includes 11 disease areas, 15 first class clinical specialist departments and 18 second class specialist departments and 17 medical auxiliary departments. The infectious disease department is the key discipline at the prefectural level; the orthopedics, neurology and urology are the key disciplines at the county level.	2 key specialist departments at provincial level; 8 key specialist departments at the Prefectural level; and one model base for primary care suitable technology scale-up at the provincial level.
Aim	To be upgraded into a Grade Three (Class (B) general hospital, with ‘quality as core and patient-centered’ as its mission. It vowed to provide more comprehensive medical health service with more scientific management, more sophisticated technique, more advanced equipment, higher noble ethics and higher quality services.	Become a modern holistic tertiary hospital to provide highest quality services, adopt the latest technology and the most beautiful environment to service population.
Expansion	Being relocated, with an investment of RMB680 million. The new hospital aimed to	Being re-allocated/constructed with an investment RMB1.07 billion, aiming to cover 1500 beds, and an area 146,666 square meters,

	host 800 beds and cover a constructive area of 80000 square meters.	with constructive area of 216000 square metres.
External collaboration	The hospital established a collaborative relationship with the First Hospital of Zhejiang Medical University and Central Hospital of Wenzhou.	<p>Joined the Shanghai Ren Ji Medical Group and became Shanghai Jiao Tong University Medical school's affiliate hospital in 2004.</p> <p>Became a medical education and training base at the prefecture in 2009, a medical education and training base for An'hui Medical University in 2010 and Fujian Chinese Medicine University in 2012.</p> <p>In 2012, established Translation Medicine Research Center in collaboration with Wenzhou Medical Universality.</p> <p>In 2012, started to link with Taiwan Zhangji Hospital as 'friendship hospital'.</p>
Honours	Received several honours such as 'Superior hospital of medical quality in Wenzhou', 'provincial Green hospital', 'provincial civilization hospital', 'provincial model hospital with excellent female health workers' and so on.	<p>Received many provincial-level honours such as 'Civilized hospital', 'Baby-friendly hospital', 'Environmental-friendly hospital' and 'Safety hospital'</p> <p>In 2012 and 2013, the hospital ranked the top hundred county hospitals in terms of comprehensive strength in China.</p> <p>Passed the assessment of the American JCI(Joint Commission International Accreditation) in 2014</p>